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HOW TO USE YOUR PDA
JULY 2004

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A Sandhills Publication

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July 2004
Vol. 2 Iss. 7
$5.99 U.S.
$7.99 Canada

IBM ThinkPad X Series

GO with IBM Think Express Program

IBM Think Express models are designed, configured and priced with small to medium-size businesses in mind.

CNET Editors Choice Award, March, 2004
IBM ThinkPad X40

*Availability: All offers subject to availability. IBM reserves the right to alter product offerings and specifications at any time, without notice. IBM is not responsible for photographic or typographic errors. **Pricing:** does not include tax or shipping and is subject to change without notice. Reseller prices may vary. **Warranty:** For a copy of applicable product warranties, write to: Warranty Information, P.O. Box 12195, RTP, NC 27709, Attn: Dept JCJA/B205. IBM makes no representation or warranty regarding third-party products or services. **Footnotes:** (1) **Processor:** With Intel SpeedStep® processor speed may be reduced to conserve battery power. (2) **Wireless:** based on IEEE 802.11a, 802.11b and 802.11g, respectively. An adapter with 11a/b, 11b/g or 11a/b/g can communicate on either or any of these listed formats respectively; the actual connection will be based on the access point to which it connects. (3) **Included software**: may differ from its retail version (if available) and may not include user manuals or all program functionality. License agreements may apply. (4) **Hard drive:** GB = billion bytes. Accessible capacity is less; up to 4GB is set to partition. (5) **Memory:** For PCs without a separate video card, memory supports both system and video. Accessible system memory is up to 64MB less than the amount stated, depending on video mode. (6) **Limited warranty:** Support unrelated to a warranty issue may be subject to additional charges. (7) **ServicePac services:** are available for machines normally used for business, professional or trade purposes, rather than personal, family or household purposes. Service period begins with the equipment date of purchase. Service

IBM recommends Microsoft® Windows® XP Professional for Business.

Protect your data against accidents when you're on the road.

Accidents definitely do happen. Especially when you're working wirelessly. Which is why you should have an IBM ThinkPad® notebook. Select ThinkPad notebooks are the only PCs designed to sense a fall and, within 500 milliseconds, park the hard drive's read/write head. Kind of like an airbag for your data. To view a demo, visit **ibm.com**/shop/m419. You'll see why select IBM ThinkPad notebooks with Intel® Centrino™ Mobile Technology give wireless users the confidence to tackle almost anything—networking, presentations, even the occasional meeting with the pavement. And go from "oh, #@*^!" to "phew" in less than a second.

Klutz-proof wireless. Only on a ThinkPad.

1 866 426-9337 | **ibm.com**/shop/m419
Standard shipping included when you order online.[9]

NEW! IBM ThinkPad R51

Ultimate Value

Distinctive IBM Innovations:

- IBM Active Protection System – Helps protect your hard drive from falls

System Features:

- Intel® Centrino™ Mobile Technology
  - Intel Pentium® M Processor 1.50GHz[2]
  - Intel PRO/Wireless Network Connection 802.11b/g[3]
- Microsoft Windows XP Professional[4]
- 14.1" XGA TFT display (1024x768)
- 256MB DDR SDRAM[5]
- 20GB hard drive[6]
- Ultrabay™ Enhanced CD-RW/DVD-ROM combo
- IBM UltraConnect™ Antenna for increased signal strength[7]
- 1-yr system/battery limited warranty[8]

NavCode 28B5200-M419
THINK EXPRESS MODEL PRICED AT: **$1,299***

ServicePac® Service Upgrade:[8]
3-yr Depot Repair #30LS192 **$132**

IBM ThinkPad X40

Our thinnest and lightest

Distinctive IBM Innovations:

- IBM Active Protection System – Helps protect your hard drive from falls
- NEW! IBM Rescue and Recovery™ with Rapid Restore™ – One-button recovery and restore solution

System Features:

- Intel Centrino Mobile Technology
  - Intel Pentium M Processor 735 1GHz
  - Intel PRO/Wireless Network Connection 802.11b
- Microsoft Windows XP Professional
- 12.1" XGA TFT display (1024x768)
- 256MB DDR SDRAM
- 20GB hard drive
- Integrated Gigabit Ethernet and modem
- Legendary IBM full-size keyboard[1]
- Only .94" thin[10]
- 2.7-lb travel weight[10]
- 1-yr system/battery limited warranty[8]

NavCode 23B612U-M419
THINK EXPRESS MODEL PRICED AT: **$1,499**

levels are response-time objectives and are not guarantees. If the machine's problem turns out to be a Customer Replaceable Unit (CRU), IBM will express ship the part to you for quick replacement. Onsite 24x7x2-hour service is not available in all locations. For ThinkPad notebooks requiring LCD or other component replacement, IBM may choose to perform service at the depot repair center. **(1) Full-size keyboard:** As defined by ISO/IEC 15412. **(9) Shipping:** Standard shipping included when you order online. U.S. only. **(10) Travel weight:** Includes battery and optional travel board instead of standard optical drive in Ultrabay bay, if applicable; weight may vary due to vendor components, manufacturing process and options. **Thinness:** may vary at certain points on the system. **(11) Wireless capability:** requires compatible wireless-enabled options, sold separately. **Trademarks:** The following are trademarks or registered trademarks of IBM Corporation: IBM, the IBM logo, Rapid Restore, Rescue and Recovery, ThinkPad, Ultrabay, UltraConnect and UltraNav. Microsoft and Windows are registered trademarks of Microsoft Corporation. Intel, Intel Inside, Intel Inside logo, Intel Centrino, Intel Centrino logo, Intel SpeedStep and Pentium are trademarks or registered trademarks of Intel Corporation or its subsidiaries in the United States and other countries. Other company, product and service names may be trademarks or service marks of other companies. ©2004 IBM Corporation. All rights reserved.
Visit www.ibm.com/pc/safecomputing periodically for the latest information on safe and effective computing.

Take a look at our latest models. And get something nice to shout about.

Why IBM ThinkPad Notebooks?

To make IBM ThinkPad® notebooks even more valuable, each one featured here comes with all the following ThinkVantage™ Technologies:

IBM Active Protection System:

Buttoningers unite! IBM ThinkPad notebooks now include airbag like technology to help protect your hard drive from some damage caused by drops and jolts (select models).

NEW! Rescue and Recovery with Rapid Restore:

Lost your data because of a software crash or virus? Recover previously saved data in minutes with our one-button solution.

Access Connections:

Switch between wired and wireless connections anytime.

Embedded Security Subsystem 2.0:[1]

Hackers and thieves, beware. Our combined hardware and software solution is designed to protect user data and keep it private.

Access IBM:

Get the help you need, when you need it. One button on your ThinkPad notebook brings you a world of resources and assistance.

NEW! IBM ThinkPad R51

System Features:

- Intel® Centrino™ Mobile Technology
  - Intel Pentium® M Processor 1.50GHz[2]
  - Intel PRO/Wireless Network Connection 802.11b/g[3]
- Microsoft Windows XP Professional[4]
- 15" SXGA+ TFT display (1400x1050)
- 256MB DDR SDRAM[5]
- 40GB hard drive[6]
- Integrated Ethernet and modem
- IBM Ultrabay™ Enhanced CD-RW/DVD-ROM combo
- IBM UltraConnect™ Antenna for increased signal strength[3]
- 1-yr system/battery limited warranty[7]

NavCode 1836BDU-M419

THINK EXPRESS MODEL PRICED AT: **$1,499***

With Microsoft Office Small Business Edition 2003:[8] $1,739

NEW! IBM ThinkPad T42

System Features:

- Intel Centrino Mobile Technology
  - Intel Pentium M Processor 1.50GHz
  - Intel PRO/Wireless Network Connection 802.11b/g
- Microsoft Windows XP Professional
- 14.1" XGA TFT display (1024x768)
- 32MB ATI Mobility RADEON 7500 graphics
- 256MB DDR SDRAM
- 30GB hard drive
- Integrated Gigabit Ethernet and modem
- IBM Ultrabay Slim DVD-ROM
- IBM UltraConnect Antenna for increased signal strength
- Only 1" thin,* 4.5-lb travel weight[1]
- 1-yr system/battery limited warranty[7]

NavCode 2378DTU-M419

THINK EXPRESS MODEL PRICED AT: **$1,689**

With Microsoft Office Small Business Edition 2003: $1,919

ServicePac® Service Upgrade:[10]
2-yr Onsite Repair/9x5/Next Business Day Response #30L9189 **$197**

NEW! IBM ThinkPad T42

System Features:

- Intel Centrino Mobile Technology
  - Intel Pentium M Processor 735 (1.70GHz, 400MHz FSB)
  - Intel PRO/Wireless Network Connection 802.11b/g
- Microsoft Windows XP Professional
- 15" SXGA+ TFT display (1400x1050)
- 512MB DDR SDRAM
- 64MB ATI Mobility RADEON 9600 graphics
- 60GB hard drive (7200 RPM)
- Integrated Gigabit Ethernet and modem
- IBM Ultrabay Slim CD-RW/DVD-ROM combo
- IBM UltraConnect Antenna for increased signal strength
- 3-yr system/1-yr battery limited warranty[7]

NavCode 2379DXU-M419

THINK EXPRESS MODEL PRICED AT: **$2,469**

With Microsoft Office Small Business Edition 2003: $2,179

ServicePac Service Upgrade:
4-yr Onsite Repair/9x5/Next Business Day Response #69P9198 **$299**

IBM ThinkPad X40

System Features:

- Intel Centrino Mobile Technology
  - Intel Pentium M Processor ULV 1GHz
  - Intel PRO/Wireless Network Connection 802.11b
- Microsoft Windows XP Professional
- 12.1" XGA TFT display (1024x768)
- Intel Extreme Graphics 2
- 256MB DDR SDRAM
- 20GB hard drive
- Integrated Gigabit Ethernet and modem
- Legendary IBM full-size keyboard[11]
- Only .94" thin, 2.7-lb travel weight
- 1-yr system/battery limited warranty[7]

NavCode 2386ICU-M419

THINK EXPRESS MODEL PRICED AT: **$1,499**

With Microsoft Office Small Business Edition 2003: $1,739

ServicePac Service Upgrade:
3-yr Depot Repair #30L9192 **$132**

IBM ThinkPad X40

Distinctive IBM Innovations:

- Longest standard battery life of any leading-brand notebook[12]

System Features:

- Intel Centrino Mobile Technology
  - Intel Pentium M Processor LV 1.20GHz
  - Intel PRO/Wireless Network Connection 802.11b
- Microsoft Windows XP Professional
- 12.1" XGA TFT display (1024x768)
- Intel Extreme Graphics 2
- 256MB DDR SDRAM
- 40GB hard drive
- Integrated Gigabit Ethernet and modem
- Legendary IBM full-size keyboard
- 7.5-hr Li-Ion battery[13]
- 1-yr system/battery limited warranty[7]

NavCode 2389RGU-M419

THINK EXPRESS MODEL PRICED AT: **$1,749**

ServicePac Service Upgrade:
3-yr Onsite Repair/9x5/Next Business Day Response #30L9195 **$243**

IBM ThinkPad X40 Solution Pack

System Features:

- Intel Centrino Mobile Technology
  - Intel Pentium M Processor ULV 1GHz
  - Intel PRO/Wireless Network Connection 802.11b
- Microsoft Windows XP Professional
- 12.1" XGA TFT display (1024x768)
- 256MB DDR SDRAM
- 20GB hard drive
- 2.7-lb travel weight
- 1-yr system/battery limited warranty[7]

Accessories Included:

- ThinkPad X4 UltraBase™ Dock
- IBM Ultrabay Slim CD-RW/DVD-ROM combo

NavCode 2386IZU-M419

THINK EXPRESS MODEL PRICED AT: **$1,799**

ServicePac Service Upgrade:
3-yr Onsite Repair/9x5/Next Business Day Response #30L9195 **$243**

IBM ThinkPad X40 Solution Pack

Distinctive IBM Innovations:

- Longest standard battery life of any leading-brand notebook

System Features:

- Intel Centrino Mobile Technology
  - Intel Pentium M Processor LV 1.20GHz
  - Intel PRO/Wireless Network Connection 802.11b
- Microsoft Windows XP Professional
- 12.1" XGA TFT display (1024x768)
- 256MB DDR SDRAM
- 40GB hard drive
- Integrated Gigabit Ethernet and modem
- 7.5-hr Li-Ion battery
- 3-yr system/1-yr battery limited warranty[7]

Accessories Included:

- ThinkPad X4 UltraBase Dock
- IBM Ultrabay Slim CD-RW/DVD-ROM combo

NavCode 2382GUU-M419

THINK EXPRESS MODEL PRICED AT: **$2,199**

ServicePac Service Upgrade:
5-yr Onsite Repair/9x5/Next Business Day Response #69P9200 **$449**

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(Monitor not included)

(Monitor not included)

(Monitor not included)

Why IBM ThinkCentre PCs?

Only IBM offers these features to protect you, connect you, and keep you working. Each ThinkCentre™ desktop featured here can give you the efficiency, productivity and edge you need with the following ThinkVantage Technologies:

IBM Rapid Restore Ultra:

Lost your data because of a software crash or virus? Recover previously saved data in minutes with our one-button solution.

Access IBM:

Get the help you need, when you need it. One button on your ThinkCentre desktop brings you a world of resources and assistance.

ImageUltra™ Builder:

Need to roll out new systems? Image and copy your operating system across your network in a flash. (Order separately)

IBM ThinkCentre A50p

System Features:

- Intel® Pentium® 4 Processor with HT Technology 2.80GHz
- Microsoft Windows XP Professional
- 256MB DDR SDRAM
- 40GB hard drive • CD-RW
- Intel Extreme Graphics 2
- Integrated 10/100 Ethernet
- Norton AntiVirus™ with 90 days of virus definition updates
- Lotus® SmartSuite® Millennium license
- 1-yr parts/1-yr limited onsite service limited warranty[12]

NavCode 8CCD48U-M419

THINK EXPRESS MODEL PRICED AT: **$719**

With Microsoft Office Small Business Edition 2003: $959

IBM ThinkCentre A50

Distinctive IBM Innovations:

- The smallest IBM desktop without compromise: 62% smaller than a standard IBM desktop

System Features:

- Intel Pentium 4 Processor with HT Technology 2.80GHz
- Microsoft Windows XP Professional
- 256MB DDR SDRAM
- 40GB hard drive • CD-ROM
- Integrated 10/100 Ethernet
- Norton AntiVirus with 90 days of virus definition updates
- Lotus SmartSuite Millennium license
- 3-yr parts/1-yr limited onsite service limited warranty[12]

NavCode 8119J3U-M419

THINK EXPRESS MODEL PRICED AT: **$789**

With Microsoft Office Small Business Edition 2003: $1,029

ServicePac Service Upgrade:
4-yr Onsite Repair/9x5/Next Business Day Response #69P9158 **$198**

IBM ThinkCentre A50p

System Features:

- Intel Pentium 4 Processor with HT Technology 2.80GHz
- Microsoft Windows XP Professional
- 256MB DDR SDRAM
- 40GB hard drive • CD-RW
- Norton AntiVirus with 90 days of virus definition updates
- Integrated 10/100 Ethernet
- Lotus SmartSuite Millennium license
- 3-yr parts/1-yr limited onsite service limited warranty[12]

NavCode 8CCD48U-M419

THINK EXPRESS MODEL PRICED AT: **$809**

With Microsoft Office Small Business Edition 2003: $1,049

IBM ThinkCentre S50

Distinctive IBM Innovations:

- The smallest IBM desktop without compromise: 62% smaller than a standard IBM desktop

System Features:

- Intel Pentium 4 Processor with HT Technology 2.80GHz
- Microsoft Windows XP Professional
- 512MB DDR SDRAM
- 40GB hard drive • CD-ROM
- Norton AntiVirus with 90 days of virus definition updates
- Gigabit Ethernet-integrated
- 3-yr limited warranty with limited onsite service[12]

NavCode 818398U-M419 **$1,079**

With Microsoft Office Small Business Edition 2003: $1,319

ServicePac Service Upgrade:
4-yr Onsite/9x5/4-hr Response #69P9162 **$250**

IBM ThinkCentre M50

System Features:

- Intel Pentium 4 Processor with HT Technology 2.80GHz
- Microsoft Windows XP Professional
- 512MB DDR SDRAM
- 40GB hard drive • CD-ROM
- Intel Extreme Graphics 2
- Gigabit Ethernet-integrated
- 3-yr limited warranty with limited onsite service[12]

NavCode 8187EJU-M419 **$1,049**

With Microsoft Office Small Business Edition 2003: $1,288

ServicePac Service Upgrade:
3-yr Onsite/9x5/4-hr Response #41L2734 **$129**

intel inside centrino MOBILE TECHNOLOGY

IBM recommends Microsoft® Windows® XP Professional for Business.

IBM Think Express Program:

We've designed and priced many of our products specifically for small and medium businesses. And best of all, they're available direct from IBM or through your IBM Business Partner.

IBM ThinkPad Accessories

Belkin Components Universal Notebook Travel Surge Protector
#22P7127 **$20**

Targus Deluxe Mobile Essentials Kit
#22P7437 **$60**

ThinkPad Premiere Leather Carrying Case[13]
#10K0209 **$99**

ThinkPad 72W AC/DC Combo Adapter
#22P9010 **$99**

ThinkPad Port Replicator II
#74P0733 **$179**

IBM ThinkCentre Accessories

128MB USB 2.0 High-Speed Memory Key
#22P8229 **$50**

Lexmark X61/0 All-in-One
#22P5147 **$280**

IBM ThinkVision™ L170 17" Flat Panel Monitor with system purchase
#W95PNB0 **$449**

IBM

1 866 426-9337 | **ibm.com**/shop/m419

Standard shipping included when you order online.[16]

applicable; weight may vary due to vendor components, manufacturing process and options. **Thinness:** may vary at certain points on the system. **(10) ServicePac services:** are available for machines normally used for business, professional or trade purposes, rather than personal, family or household purposes. Service period begins with the equipment date of purchase. Service levels are response-time objectives and are not guarantees. If the machine problem turns out to be a Customer Replaceable Unit (CRU), IBM will express ship the part to you for quick replacement. Onsite 24x7x2-hour service is not available in all locations. For ThinkPad notebooks requiring LCD or other component replacement, IBM may choose to perform service at the depot repair center. **(11) Full-size keyboard:** As defined by ISO/IEC 15412. **(12) Battery life:** Based on manufacturer's published figures or CNET.com results for the top 5 vendors in 2003 notebook sales, as of 1/29/2004. **(13) Systems with limited onsite service:** are designed to be repaired during the applicable warranty period primarily with customer-replaceable parts provided by IBM. IBM will only send a technician onsite to perform a repair if (a) remote telephone diagnosis and/or customer part replacement are unable to resolve the problem, or (b) the part is one of the few designated by IBM for onsite replacement. For a list of onsite replaceable parts, contact IBM. Support unrelated to a warranty issue may be subject to additional charges. **(14) Certain IBM logo products:** are not manufactured, warranted or supported by IBM. IBM logos and trademarks used under license. Contact IBM for details. **(15) Wireless capability:** requires compatible wireless-enabled options, sold separately. **(16) Shipping:** Standard shipping included when you order online, U.S. only. **(17) Battery:** These model numbers achieved the Ziff Davis Media, Inc.'s Business Winstone® 2002 BatteryMark™ Version 1.0 Battery Rundown Time of at least the time shown. This test was performed without independent verification by the VeriTest testing division of Lionbridge Technologies, Inc. ("VeriTest") or Ziff Davis Media, Inc.; neither Ziff Davis Media, Inc., nor VeriTest makes any representations or warranties as to these test results. Winstone is a registered trademark and BatteryMark is a trademark of Ziff Davis Publishing Holdings, Inc., in the U.S. and other countries. A description of the environment under which the test was performed is available at ibm.com/pc/ww/thinkpad/batterylife. Battery life (and recharge times) will vary based on many factors including screen brightness, applications, features, power management, battery conditioning and other customer preferences. **Trademarks:** The following are trademarks or registered trademarks of IBM Corporation: IBM, the IBM logo, ImageUltra, Lotus, NavCode, Rapid Restore, Rescue and Recovery, SmartSuite, ThinkCentre, ThinkPad, ThinkVantage, ThinkVision, UltraConnect, UltraBase, UltraBay and UltraBay. Microsoft and Windows are registered trademarks of Microsoft Corporation. Intel, Intel Inside, Intel Inside logo, Intel Centrino, Intel Centrino logo, Intel SpeedStep and Pentium are trademarks or registered trademarks of Intel Corporation or its subsidiaries in the United States and other countries. Other company, product and service names may be trademarks or service marks of other companies. © 2004 IBM Corporation. All rights reserved.

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Consumer Electronics

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Open

The Open section is your source for consumer electronics news, quick looks at new products and products that haven't yet made it to America, and general commentary on the industry. This month, see how far behind the United Sates is in terms of cell phone technology, get Sascha Segan's take on the classic gaming market (or the lack thereof), and arm yourself with 15 tips on how to shop smarter for electronics.

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20 15 Tips On . . . Shopping For Consumer Electronics

Reviews

PDAs, camcorders, digicams, DVD and MP3 players . . . you name it, we review it in this issue. We even look at a couple of products that claim they can fix your scratched CDs and DVDs. If you're in the market for a DVD burner for your PC, head to page 32 for our take on five multiformat drives.

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A/V Club

What's the difference between a $100 pair of speakers and a pair that costs $500? Do audio components need to be broken in like you would a new car? We explore these and other questions in this installment of A/V Club; along the way, we'll show you how to get a handle on the mass of cables behind your entertainment center and how to decipher all the tiny symbols on the back of your DVD cases. Also, check in with Brian Hodge for more on your rights as a consumer in the age of digital media.

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Do More With Your PDA

PDAs HAVE COME A LONG, LONG WAY in the past few years. They've come so far, in fact, that using one can seem fairly daunting right out of the box, what with all the high-end features they've adopted. This month, we'll show you how to perform a bevy of common PDA-related tasks and then get down to the nitty gritty with both the Pocket PC and Palm OS operating systems. One thing's for sure, you'll have more fun here than you will in any owners manual, and we'll toss in a few recommendations along the way in case you still haven't decided which PDA is best for you.

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Some Of Our Favorite Palm OS & Pocket PC PDAs

Digital Studio

THERE ARE A NUMBER of pretty good photo- and video-editing programs out there today, and in most cases, you probably can't go too wrong as long as you stick to a brand you're comfortable with. But if you'd like to know more about your options among video editors, see our head-to-head review on page 83. Check out page 74 for a quick tutorial on how to make your digital shots better with today's software tools, and get the lowdown on the still photography feature lots of camcorders are touting these days on page 80.

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Which Video Editor Will Make Your Movies Into Masterpieces?

CE @Home

WHAT IS BLUETOOTH and why do you need it in your car? Find out on page 88, and check out part two of our two-part series on using your PC to create and edit audio like a pro. Speaking of PCs, you've probably heard the computer guys where you work chattering excitedly about PCI Express; find out why they're so excited in this issue.

88 **Bluetooth Hits The Road**
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Press Play

AS WE DO EVERY MONTH, we've packed this section with fun stuff, starting with the light-hearted and sometimes quirky gadgets in CE Lite. Get our take on several of the latest CDs, DVDs, and video games; bone up on the history of the workhorse of modern society (the computer printer), and check out what we liked best this issue in our CE Pick Of The Month.

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Worlds Collide (& We Like The Results)

Web-Only Articles

THERE'S SO MUCH GOING ON IN THE WORLD OF CONSUMER ELECTRONICS that it won't all fit in our magazine, so we're serving up a few extra *CE Tips* articles and reviews at www.cetips.com. If you're a *CE Tips* subscriber (or if you subscribe to *Smart Computing*, *PC Today*, or *Computer Power User*), head to the online table of contents for this issue, and you'll find links to each of the articles mentioned here.

The Double A Stands Up
Penlight Batteries Reach Maturity

DVD Movie Reviews:
Samurai Jack Season 1
Something's Gotta Give

Editor's Note

This month in *CE Tips*, we look at today's PDA, which is a far cry from the glorified organizers of the past. Like most electronic devices on the market these days, PDAs are taking on the functions of an increasing number of portable CE gadgets, including everything from digital cameras to wireless phones. With the right PDA (and in some cases, the right add-ons), you can play your favorite digital tunes, find yourself with GPS (Global Positioning System) satellite reception, surf the Web, and send and receive email, and that's an awful lot of stuff to pack into one pocket-sized unit.

But in many ways, PDAs are more than just convergent mobile devices; they are fully functional computers that are only a few steps away from the complexity of a high-end desktop PC. And while their necessarily streamlined user interfaces makes them a tad easier to navigate than a full-blown Windows PC, there's no denying that more functions equals more time spent trying to learn how to use them.

To that end, we offer 16 pages of PDA coverage, with an emphasis on how to get more out of your PDA, whether it's a Pocket PC model or one that runs palmOne's ever-evolving Palm OS. We also spend some time comparing the two main PDA camps and offer some suggestions of great models in each, in case you're still trying to decide which handheld is best for you.

Elsewhere in the issue, you'll find practical tips for streamlining the mass of cables behind your entertainment center, a look at the controversy surrounding audio component break-in periods, post-snap advice for improving your digital photos with software, and an introduction to the emerging PCI Express standard for PCs. And, of course, we've included a full helping of product news and reviews to help you keep up with the growing tide of CE products.

So enjoy the mag, let us know what you think (editor@cetips.com), and thanks for reading.

Chris Trumble, Publication Editor, *CE Tips*

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CE News

Compiled by Tracy Baker

ClearPlay Helps Censor Content

RCA (www.rca.com) has rolled out the first DVD player—the $70 DRC232N—that incorporates ClearPlay's (www.clearplay.com) content-filtering technology. ClearPlay edits out foul language, nudity, sex scenes, and graphic violence from a variety of movies, all on the fly. It works by loading censoring data into the unit's internal memory that tells the player exactly what segments of a movie it needs to modify. For example, when you insert a "Pirates Of The Caribbean" DVD and you've enabled the proper filters, the player automatically recognizes the disc and mutes the audio when characters use crude language.

The filters let you control the amount of censorship you want to apply to the movies you watch. Using a number of settings in the three main categories of Violence, Language, and Explicit Scenes & Nudity, parents can lock out everything from strong profanity and explicit sex to blasphemy and moderate violence. There's even a setting that blocks scenes that involve explicit drug use.

The downside to ClearPlay is that it can only censor movies for which you've loaded the associated filters in the DVD player's internal memory. The RCA unit comes preloaded with 100 movie filters for a variety of box office hits, and you can download hundreds of other filters from the ClearPlay Web site, burn them to a CD, and copy them into the DVD player's memory. Single filters cost $1.50, or you can subscribe to ClearPlay for $4.95 per month or $49 per year to access all filters. Both ClearPlay and retail stores that sell ClearPlay-enabled hardware, such as Wal-Mart, also plan to offer prerecorded CDs containing additional filters that you can use if you don't have a CD burner.

The DRC232N is a progressive-scan DVD player with component, S-Video, and composite video outputs. It also has analog composite stereo outputs and a coaxial jack for digital audio output. ▮

Palisade Systems Blocks The Music

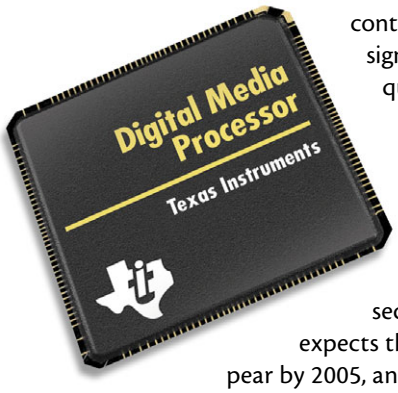
As if people who download music illegally didn't have enough to worry about with all the random RIAA (Recording Industry Association of America) lawsuits and the end of the RIAA's amnesty program, Palisade Systems' PacketHound 3 may stop the downloads all together.

This hardware is designed for installation on business networks, where it monitors network activity to detect whether copyrighted materials are being transmitted. Instead of acting like a firewall and blocking ports, a method easily bypassed by savvy file sharers, PacketHound 3 looks for certain protocols and applications that are associated with illegal file sharing and stops associated network traffic dead in its tracks. Network users have no way of knowing that the hardware is there because it passively monitors traffic, and when it notes that a flagged protocol or application is being used, it sends a reset packet to the machine on the other end, instantly severing the connection. All users see is a standard message telling them that they failed to connect to the other machine, so for all they know the file they requested is no longer available.

PacketHound is highly configurable, so it doesn't necessarily have to completely block access to protocols and applications. Instead, administrators can set it up so that if a protocol or application eats up a certain percentage of a company's Internet bandwidth, PacketHound blocks other network users from using those protocols or applications until the bandwidth use levels drop. ▮

New TI Processor To Improve Streaming Media

Texas Instruments announced the development of a new streaming media processor for use in consumer electronics devices that could dramatically improve movie, music, and photo playback and storage capabilities in future products. The new processors are powerful enough to handle multiple types of content and require less bandwidth than current designs, which means it will be easier to deliver high-quality video that requires more bandwidth or to deliver more streams simultaneously.



Modern streaming media products designed for home use can already deliver high-quality content, but TI claims the new processors will be used mainly to create a new class of videophones that display video at 30fps (frames per second) and have CD-quality sound. The company expects that devices using the new technology should appear by 2005, and it's currently working with various manufacturers on standalone videophones, as well as videophones that are integrated directly into televisions. In the future, the technology could improve to the point where HD streaming video is possible, which should add a whole new twist to call screening. ▮

palmOne Releases Two Color Zires

Once you've used a Palm OS device with a color screen, there's no going back to grayscale, but until now that rainbow of possibilities came with a hefty price tag. PalmOne (www.palmone.com) changes that by offering a color display on its $149 Zire 31; the new Zire 72 has a color display and much, much more for $299.

The Zire 31's display unfortunately has an extremely low resolution of 160 x 160, but it can display thousands of colors. It comes with 16MB of memory (14MB of which is available to users), is equipped with a 200MHz CPU, and uses the Palm 5.2.8 Garnet OS. The unit can play MP3s, but in order to do so, you'll have to buy an expansion card.

The Zire 72 seems expensive until you realize it's equipped with a 1.2MP (megapixel) digital camera that snaps photos at resolutions up to 1,280 x 960. It also shoots short video clips at 320 x 240 resolution (but you'll need to buy another expansion card to use this feature) and has a built-in voice recorder. The color display is much sharper than that of the Zire 31 thanks to its 320 x 320 resolution, and it displays more than 65,000 colors. The unit has 8MB of ROM, 32MB of RAM, a 312MHz CPU, and uses the Palm OS 5.2.8. ▮

Canon's New Opturas Maximize Megapixels

When it comes to digital camcorders and cameras, the more megapixels the merrier. Canon's new Optura 30 ($899; www.usa.canon.com) and Optura 40 ($999) embrace this concept by incorporating 2.2MP sensors in compact Mini DV camcorder frames.

The high-resolution sensors help improve the camcorders' still photo abilities. Both devices can snap images at resolutions up to 1,632 x 1,224, and you can also take 640 x 480 pictures and save them to an installed SD (Secure Digital) card while shooting video. The camcorders have far more still photo features than most competing products do, including a built-in flash, auto exposure, and selectable focus points. On the video side, the sensors let both models capture true 16:9 aspect ratio widescreen recordings by using the entire width of the sensor. This method should produce video that's much crisper than that from camcorders that create widescreen recordings by digitally stretching the video.

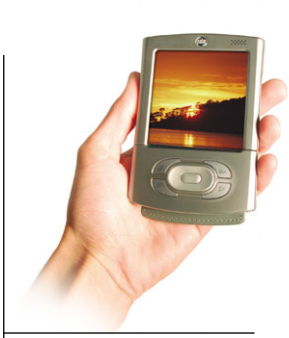
The Optura 30 has a 12X optical zoom, while the more expensive Optura 40 has a 14X optical zoom. Both incorporate image stabilization for smoother video at high zoom levels, and both support PictBridge technology so you can send your pictures directly to a PictBridge-compatible printer. The Optura 40 has several additional features, including a manual audio level control and improved low-light shooting abilities. ▮

Consumer Electronics Marketplace

Digital Television Shipments To Skyrocket

A recent report from In-Stat/MDR indicates that 2004 DTV (digital television) shipments should reach 17 million, but analysts expect that number to rise to 93 million units in 2007. The company cites several reasons for the upcoming sales explosion, including enactment of the FCC mandate requiring all sets to ship with digital tuners, increases in terrestrial digital broadcasting stations to make more content available to end users, and rapidly plunging prices that are making DTVs comparable in cost to analog models.

Handheld-Device Shipments Decline



Handheld-device shipments declined 11.7% to 2.2 million units in the first quarter of 2004, according to an IDC report, and analysts believe this is due to a traditional decline in demand during spring (after many people already bought handhelds during the holidays), coupled with repositioning in the market by a variety of manufacturers. palmOne remains the leader in market share, although its 36.1% market share is down more than 3% compared to this period last year. HP and Dell are rising in the rankings, while Toshiba and Sony are slipping.

Rank	Vendor	1Q 2004 Shipments	1Q 2004 Market Share
1	palmOne	810,183	36.1%
2	HP	577,615	25.7%
3	Sony	209,675	9.3%
4	Dell	157,399	7.0%
5	Toshiba	49,067	2.2%
	Other	442,560	19.7%
	Total	**2,246,499**	**100.0%**

Tidbits

Of people who listen to digital music, **90%** keep fewer than 1,000 songs on their PCs, and **77%** of people interested in buying a portable digital music player want the device to hold at least 1,000 songs.

Source: JupiterResearch

68% of wireless phone customers are satisfied with the coverage and services of their wireless providers.

Source: JupiterResearch

DTV sales increased **124%** in January and February 2004 compared to the same period last year, with 853,443 units sold. That was enough TVs to generate $1.3 billion in revenue, a **100%** increase from last year.

Source: Consumer Electronics Association

55% of adult Internet users have broadband access either at home or at work.

Source: Pew Internet & American Life Project

14% of Internet users who used to download illegal music files now no longer download music files at all. For **33%** of those users, the threat of lawsuits changed behavior.

Source: Pew Internet & American Life Project

Sony and Toppan Printing have developed a Blu-Ray DVD that stores **25GB** of data but is manufactured from 51% paper, making it easy to cut the discs with scissors to destroy them for security purposes.

Source: Sony

A Look At The Latest Consumer Electronics

In consumer electronics, portability is the name of the game. Whether you're moving gadgets around the house (or outside it) or moving media from one device to another, the more mobile the better. This collection highlights a few ways manufacturers are helping you get around.

BY *Gregory Anderson*

RIM BlackBerry 7750

$549.99
www.blackberry.com

BlackBerry isn't just for wireless email anymore. RIM's new 7750 handheld combines data with voice for Verizon customers. Use it as a phone, send and receive email in a variety of formats, view attachments, and text message with your colleagues back at the office. The 64,000-color screen makes sending email and SMS (Short Message Service) messages, doing PIM (personal information manager) tasks, and browsing easy on the eyes. And BlackBerry's signature keypad makes typing easy on the thumbs.

Toshiba SD-P5000

$799.99
www.toshiba.com

We've heard of DVD in a bag, DVD on the road, and DVD in the car. But DVD on the wall? Toshiba's new SD-P5000 combines a 15-inch LCD TV with a built-in DVD player, double-hinged arm, and mounting plate. Attach the device to a wall, tabletop, or other solid surface. Then fold, flip, and turn the screen for optimal viewing. An optional battery pack makes the device even more portable. Can't you see one going right on the bathroom wall?

Creative MuVo Slim

$199.99

us.creative.com

Creative's new MuVo Slim music player is anything but skimpy when it comes to features. The 0.3-inch thick device packs 256MB of storage, MP3 and WMA (Windows Media Audio) playback, and an FM radio with recorder into a stylish credit-card-sized case. The built-in microphone records voice dictation, and the backlit LCD displays menu and track information. The MuVo connects with USB 2.0, so file transfer is a snap, and the battery recharges at the same time.

Concord Eye-Q Digital Cameras

$39.99 to $69.99

www.concord-camera.com

Looking for a no-frills, point-and-shoot, foolproof digital camera? Concord has the goods. The company's new entry-level Eye-Q cameras offer VGA (Video Graphics Array) and 1MP (megapixel) resolution, built-in memory (8MB to16MB), and short video-shooting modes. They won't print posters but will still fit most screens or create 4- x 6-inch prints. If money is the object, look no further. The Concord Eye-Q 1200 and Eye-Q 640 cost just $39.99; the waterproof Eye-Q Splash is $49.99; and the 1MP Eye-Q 1000 is $69.99.

Blaupunkt Monte Carlo

$179.95

www.blaupunktusa.com

Once limited to expensive high-end car audio products, MP3 playback is rapidly becoming standard even in entry-level head units. Blaupunkt's new Monte Carlo receiver is a perfect example. The AM/FM/CD/MP3 unit displays file information and includes a remote control for backseat DJs. Equalizer and bass controls help you customize the Monte Carlo's 15W (rms [root mean square]) sound, and four-channel preouts leave room for an amplifier to take on those tasks.

Magellan RoadMate 500 Plus

$999

www.magellangps.com

Magellan's latest vehicle navigation system dispenses with the need for professional installation. The portable device comes with a mounting kit, a color touchscreen, and a 256MB CompactFlash card for storing maps. Voice guidance helps when you're on the road, and the points-of-interest database with a 100-entry address book ensures you'll always have somewhere to go.

Sharp DV-HR300

$799.95

www.sharpusa.com

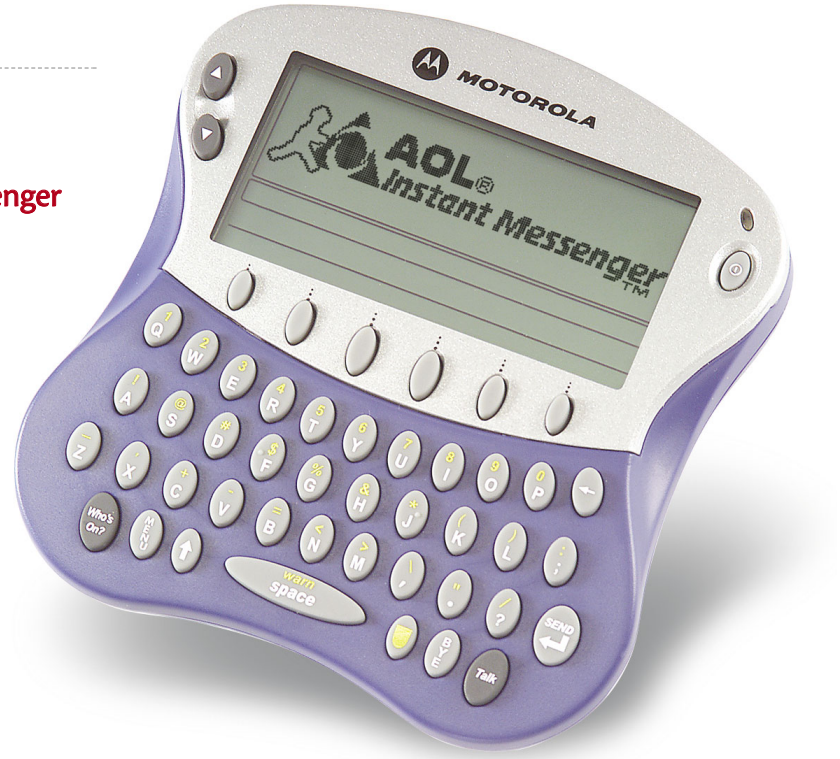
Like phones and PDAs, it was only a matter of time before the logical confluence of PVRs (personal video recorders) and DVD recorders hit the shelves. If you've ever filled up a hard drive with must-see programming, you understand the appeal of Sharp's new DV-HR300. The device combines an 80GB hard drive and VCR Plus+ programming options with a DVD+R/RW burner and editing features. Its FireWire port makes reading from a camcorder as easy as archiving lost "Simpsons" episodes. (See our review on page 25.)

Motorola IMFree Wireless Instant Messenger

$99.99

broadband.motorola.com

"It's a beautiful day. Go IM with your friend outside." Sound unlikely? Not with Motorola's new IMFree wireless instant message device. Attach the base station to an Internet-connected PC and connect up to seven handheld units wirelessly. The IMFree uses AOL's free AIM client, connecting up to six buddies at a time. Parental controls let Mom and Dad decide who gets to chat and when.



ViewSonic N3000w LCD TV

$2,999

www.viewsonic.com

ViewSonic is jumping into the flat-panel fray with a 30-inch LCD TV and monitor. The HD-ready (1,280 x 768) screen offers a 500:1 contrast ratio and 170-degree viewing angle. The N3000w also includes dual component video jacks and a DVI-HDCP (Digital Visual Interface-high bandwidth digital content protection) input for digital and HD programming. It also includes regular (NTSC [National Television Standards Committee]) TV inputs for PiP (picture in picture) and an RGB (red-green-blue) connector for hooking up a PC. At just 37 pounds, this TV can find a place just about anywhere.

Logitech Cordless Action Controller

$39.99

www.logitech.com

No more untangling the controller cord mess to figure out who's Player 1. Logitech's new Cordless Action Controller For PlayStation 2 connects wirelessly to a console-connected receiver on the 2.4GHz frequency (the same section of spectrum as cordless phones and microwave ovens). A 30-foot range provides plenty of room to roam, and the 100-hour battery life (less with vibrations turned on) provides plenty of time to keep those calluses coming.

Konica Minolta DiMAGE G600

$499.95

www.konicaminolta.us

The new DiMAGE G600 focuses on doing one thing and doing it well: taking pictures. The 6.4MP CCD's (charge-coupled device) proprietary processing ensures optimal image quality, and its Rapid Response technology delivers a 1.3-second startup. The G600 writes to both SD (Secure Digital) card and Memory Stick media or can print directly to any PictBridge-compatible printer.

Shuffle

Classics Rock!

Commentary by
Sascha Segan

Aim and shoot. Run and hide. Grab it and go. Strip away the bells, whistles, and glossy 3D graphics from the latest Xbox game, and you'll find the same elements gaming has relied on since the mid-1970s.

That's why, when I unwind, I take my gaming in its purest form: the classics. Centipede, Star Raiders, and Crystal Castles don't force me to learn six buttons or plow through movie-style cut-scenes. I can learn a classic game in minutes and play it for, well, years.

I'm not alone. The classic-gaming movement is an expanding cult with its own Web sites, specialty retailers, and trade shows. There are even some brave souls out there writing new games for the old Atari 2600 gaming system. The 2600 is too simplistic even for me, but geeks like to see what they can do within the system's strict constraints, such as 128 bytes—not megabytes, not even kilobytes, but bytes—of RAM.

Classic games aren't just for Gen Xers reliving their youth, either. Parents have been snapping up the JAKKS Pacific classic-game joystick line, which plugs directly into TVs and packs in between five and 10 older arcade games, such as Pac-Man. The stylized graphics, easy gameplay, and lack of blood and gore make classic games perfect for younger kids.

Many classic gamers play their old-style games on PCs. But you can also unleash classic games by buying a cartridge for the Game Boy Advance, by plugging one of those JAKKS joysticks into a TV, or by picking up an actual old system on eBay. Atari 2600 systems sell for up to $80 on eBay, and most of the old game cartridges go for $2 to $4. There are also software emulators you can download for an Xbox, PC, or PDA that let you play black-market ROMs of the classics, but more often than not this method puts gamers at odds with copyright laws.

MAME Is The Word

If old arcade games are your thing, the word to search for is MAME. The Multiple Arcade Machine Emulator has been around since 1997 and runs on PCs, Macs, Xboxes, Sega Dreamcast consoles, PocketPC PDAs, a few cell phones, and even—get this—certain older Kodak, Minolta, HP, and Pentax digital cameras. Yes, you can play Pac-Man on your digital camera. It's a big world out there. (A MAME-like program called Xcade brings classic arcade games to Palm OS PDAs.)

Naturally, for every grassroots effort, there's a corporate bogeyman out there waiting to deflate the fun. In this case, it's the software companies that published games in the 1980s. Electronic Arts, for example, hasn't made any money off Bill Budge's Pinball Construction Set since Reagan was president, but EA'll defend to the death its right to stop you from playing it. And while MAME itself is legal, only a handful of the thousands of games for it are (technically) legal.

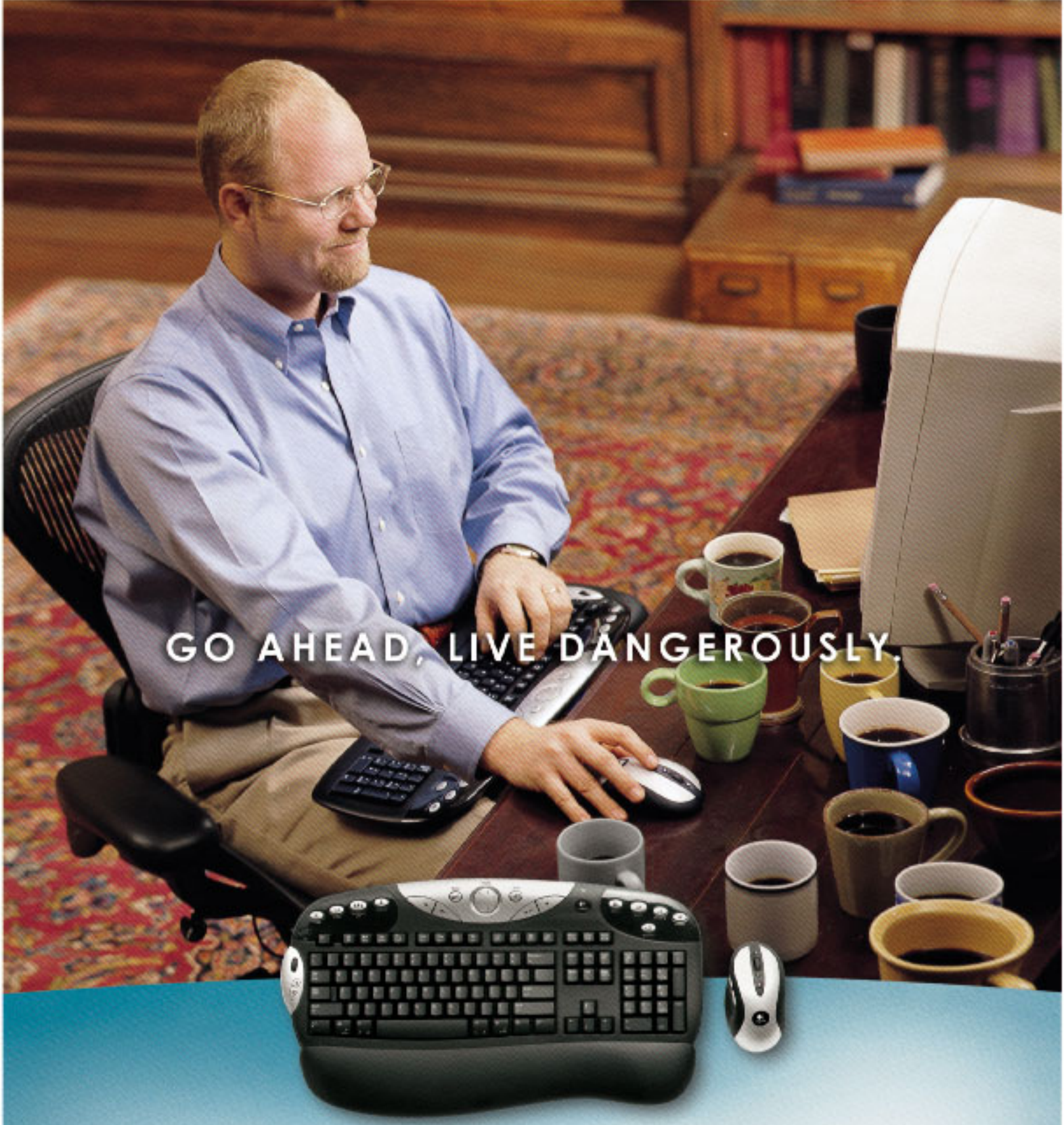
The Catch-22: The gaming companies argue that copying these games is piracy, and they have the law on their side. Copyright and trademark law give the game companies legal control over distribution of any of their former products, and they hoard the trademarks in case they want to churn out remakes or PC or console conversions of their old games.

Gamers point out that as the games haven't been sold in ages, there's no legal way to get copies. They call these orphaned games "abandonware" and say they're saving works of art from the dustbin of history by playing them on modern systems. The gaming companies say, "So what? We own the copyrights."

Gaming companies sometimes do release retail versions of the most popular classic games; Atari, Activision, and JAKKS all sell legal classics. But the vast bulk of more obscure games will remain forever in limbo.

So, because nobody's losing money off the "piracy" of games last sold in 1986, game companies largely turn a blind eye to the classic-gaming community, popping up periodically to take classic-gaming Web sites down and prove they're enforcing trademarks.

The question we should all ask game companies is: Why not release old games for free, perhaps under licenses that let gaming companies retain their trademarks to produce future versions? That's all gamers want. Electronic Arts and friends, the pinball is in your court. CE



Logitech® Cordless MX Duo™. Announcing the end of tangled mice, stuck cursors and spilled coffee. With no cords to tie you up, slow you down, or hold you back, this sleek, one-touch keyboard and advanced optical mouse give you the control and flexibility to work your way – whatever the obstacles. What will you do with all that freedom?

www.logitech.com

Logitech

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Extreme CE

When Money Is No Object

You went out and splurged on a flat panel. After giving your wallet a chance to catch its breath, it's now time for the rest of your home theater system to catch up. These high-end components will help fill out the viewing room of your dreams.

COMPILED BY GREGORY ANDERSON

Integra Research RDA/RDC-7.1 AV Controller & Power Amplifier

$9,000 total • www.integraresearch.com

This THX Ultra2-certified pair provides the foundation for a top-of-the-line 7.1-channel cinema system. The RDC-7.1 AV controller is a modular system that allows for future upgrades by adding or replacing expansion cards, with the help of a licensed dealer and Web site wizard. The default version includes RCA preamp outputs and FireWire connections (for SACD [Super Audio CD] and DVD-A players). Audio and video modules offer all sorts of digital and analog connections, plus component video switching and upconversion. The RDA-7.1 amplifier pounds out an astounding 150 watts per channel (rms [root mean square]) to all your surround channels.

Pioneer SE-DIR800C Wireless Headphones

$475 • www.pioneerelectronics.com

Pioneer's new Dolby Digital surround-sound headphones are more than just great sounding; they're also portable. With a 25-foot range, you can sit on the couch without running wires to the entertainment center. They reliably re-create surround sound effects and are Pro Logic II-capable (converting stereo signals into surround sound). The unobtrusive transmitter connects to analog and digital sources, and the headphones themselves are attractive and comfortable. You've tripped over your last wire.

Sound-e-Motion M-100-20 BF

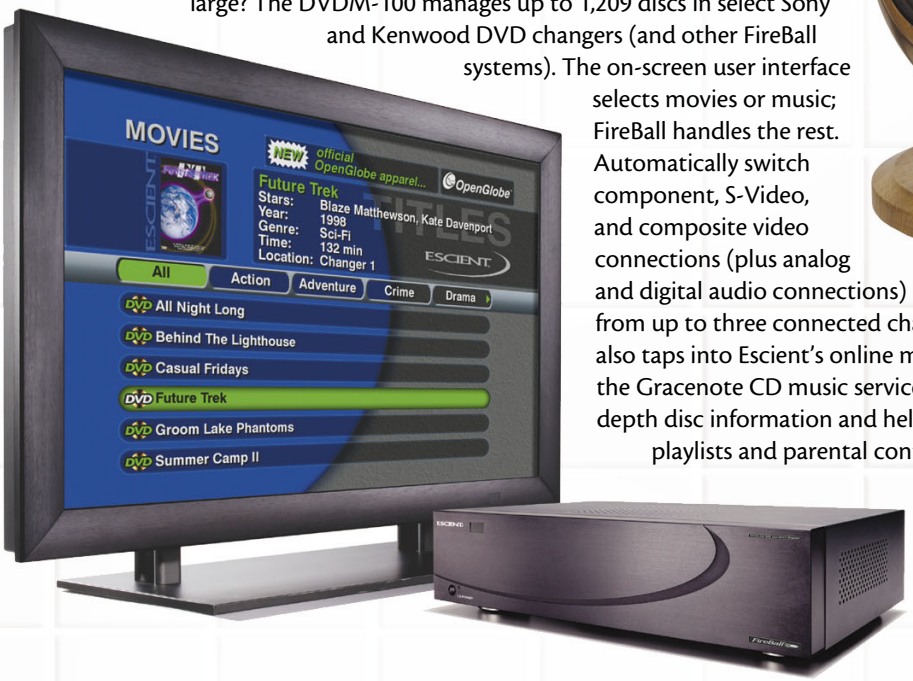
$5,600 per pair • www.sound-e-motion.com

These little balls of joy are sure to spark conversation in your theater room, if nothing else. Each sphere is handmade from solid wood, using only wood, glue, and wax to build the enclosure. The speakers have no flat reflecting surfaces and are rated at 140 watts. And, if you need to match the woodwork, Sound-e-Motion can create custom versions in your choice of wood.

Escient FireBall DVDM-100 DVD & Music Management System

$1,999 • www.escient.com

Escient's FireBall DVDM-100 system helps manage large media libraries. How large? The DVDM-100 manages up to 1,209 discs in select Sony and Kenwood DVD changers (and other FireBall systems). The on-screen user interface selects movies or music; FireBall handles the rest. Automatically switch component, S-Video, and composite video connections (plus analog and digital audio connections) from up to three connected changers. The system also taps into Escient's online movie database and the Gracenote CD music service to retrieve in-depth disc information and help you manage playlists and parental controls.



Theta Digital Compli Universal Disc Player

$4,500 • www.thetadigital.com

A theater system is nothing without a DVD player, and this is no ordinary player. Pick a format: DVD-Audio? DVD-R/RW? Super Audio CD? VCD, DVD-ROM, DVD-RAM, and MP3? Yes. And then some. Theta's flagship model supports 14 formats in all. The back panel bristles with connectors: Component jacks, S-Video, composite video, and digital and analog 5.1-channel preamp outputs combine with a proprietary DVD-A/SACD output. If it's round and shiny, the Compli probably plays it.

GADGET Envy

Upping The Ante

Compiled by Sascha Segan

The game works like this: European and Asian cell phones have been a step ahead of ours for years. Every time we take a step, they take one, too, so they're *still* a step ahead. That means better cameras and more daring designs are proliferating across the rest of the world, while over here, we get what they'd consider 2003-era technologies.

For example, we're just getting 1MP (megapixel) camera phones this summer. The Japanese have been using 2MP camera phones for months now. Super-high-quality camera phones, such as the NTT DoCoMo SH505iS take pictures that make perfectly good 4-inch x 6-inch prints, leaving the rest of us with a severe case of the jaggies. It also supports add-in memory cards so you can pack hundreds of pictures into your phone and download them easily to a PC. Expect 2MP phones to appear in the United States sometime in 2005.

Handsets in the United States are only now getting GPS (Global Positioning System) capabilities, and applications that sense your location have been "coming soon" for a while. In Japan, meanwhile, users of the NTT DoCoMo F661i phone are able to plot their locations or find restaurants or subway stations on a handy map on their phones' screens. If that doesn't grab you immediately, remember that in Japan, most streets don't have names and are laid out in seemingly random order. Another model, the F672i, features a pedometer so you can measure how long you've been walking in circles.

Japanese mobile-phone thieves fear snatching an NTT DoCoMo F900i. With its built-in fingerprint sensor, it rejects the touch of unfamiliar hands. It's no slouch in the features department, either, with a 1MP camera, the ability to play Flash games like the ones you find on Web pages, and neat avatar-based video-conferencing software that makes you look like a cartoon character when talking to your friends. Press buttons on the phone to make your cartoon avatar smile or grimace—very Japanese!

DoCoMo competitor KDDI has gone for looks with its wildly successful Infobar line in Japan. Slim, light, and made of a magnesium alloy, the Infobar phones come in four designs meant to represent a Japanese fish (pictured), a building, a kimono, and tofu. The Infobar phones also feature low-res cameras with flashes, but clearly, the look's the thing here. New designs come out every few months because, as a KDDI spokesman told us, "Japanese change the fashion every day. You always have to have the latest!" An entire consumer electronics line, PlusMinus-Zero (www .plusminuszero .jp) can help you spread Infobar's spare-but-striking look all over your living room.

Nokia's been doing pretty well at giving Americans the goods, but the company has saved a few treats for the folks at home in Europe. Its latest fashion phone, the Nokia 7200, features "sensual textile covers," including this sleek white version and one with a somewhat Louis Vuitton look. The British "gadget girl" writers at www.shinyshiny.tv have been oohing and aahing over this one. The 7200 also sports a built-in FM radio and low-res camera, but as with the Japanese Infobar phones, this model's all about the looks. It has style packs with design-coordinated phone covers, carrying cases, wrist straps, and even on-screen wallpaper.

Even Europeans will have to wait for the Panasonic X300, which is coming to the continent later this year. It's the first camera phone you actually hold like a camcorder, thanks to its pop-out screen. It's not going to replace your camcorder. It only shoots very short video clips, and the camera is a pretty low-res model. But it's a new way of looking at images on a phone, and models bought in Europe will work in the United States.

Want something completely different? Korean cell phone manufacturer Telson is on its second generation of watch phones with the TWC-2050. This one actually looks like a watch and dials like a phone. Bluetooth wireless technology lets you use a wireless headset rather than hold your wrist up to your ear, no matter how Dick Tracy cool that may seem. Alas, there are no plans to bring this phone to the United States; it's more likely to appear in India, where Telson's first-generation watch phones are on sale.

15 Tips On . . . Shopping For Consumer Electronics

1 Keep Extended Warranties

Hold on to your extended warranties and know where to find them: a file folder is fine (as long as you know where it is), a desk drawer, briefcase, or anything else. Just know where they are. As a backup, keep a word processing file, spreadsheet file, or database file with all your warranty information in it. And remind yourself as you buy your extended warranties that they're there for you to use. If something stops working, dig out your warranty (or look in your spreadsheet) and see if you can get it replaced. With electronics, you often end up with something better than you originally had.

2 Valid Expenses

If you own a business, pay attention to what counts as a valid expense. You might discover that the consumer electronics purchase you want to make can legitimately constitute a tax deduction, at least in part (or amortized over a period of time). Do you need pictures of products or people on your Web site? Ask your accountant how to get that digital camera. Do you work better with high-quality classical music in the background? You might have a case for working a good stereo into your budget and tax deduction plans. If any of these legitimately function in that way (and find out first), you should probably use your business' name to buy them and give the receipts to your accountant. In the case of buying computers online, look on the site for business leases.

3 Rebate Realities

Many stores offer mail-in rebates in order to discount the purchase price of consumer electronics products. The rebates are great, but take careful note of the expiration date and be sure to send them in on time. If you have a rebate coming, gather everything necessary to collect it, including the receipt and other possible proofs of purchase. Don't throw away the product box in case you need the bar code from it, and don't throw away anything the store sent home with you or that you received through a Web order. If in doubt, send in too many items rather than too few, and always keep copies for yourself.

4 Buy Now vs. Buy Later

If it's brand-new technology you can't live without, buy it. If you can just barely live without it, wait six months. If you think you'd like it, wait a year. Why? New consumer electronics technology *always* drops in price, usually decisively, over the first year of its shelf life, with a large chunk of that drop occurring in the first six months. Sure, indulge yourself with that absolute must-have, but most of us are content to wait and pay far less six months from now and a lot less a year from now. In the meantime, you can watch the prices at competing stores, you can borrow the item from a friend, or you can see if the company bundles it with another enticing product at a bargain rate.

5 Know The Return Policy

Don't leave the store or click the Complete Purchase button without being fully aware of the return, repair, and replacement policies. If the item arrives damaged, what can you do? If it's not what you thought you were getting, what can you do? If the item goes on sale next week, what can you do? Before finalizing a sale, dig through the Web site and find out. If you don't see the information, find the phone contact information (often under Contact Us or Customer Service) and place a call.

6 Warranty, Part 2

Many electronics stores offer an extended warranty at point of purchase. Typically, these extensions are just expensive enough to put you over your budget but just significant enough to make you realize you'd be an idiot not to go along with it. Unfortunately, these warranties are frequently unavailable if you buy the product from the store's Web site. Find out either by drilling down into the site or (often more quickly) phoning customer service and get the warranty if it appeals to you. If it's not available, check the Web site for in-store stock, and if you're close enough to the store, go and buy it there.

7 Beware Of Impulse Buying

This warning, of course, applies to all online buying, especially because when you're shopping online, it may seem as though you're less distracted by other products than you are in a brick-and-mortar store, in the sense that you're not physically surrounded by so many appealing products and are, therefore, less susceptible to impulse buying. On the Web, though, it's so easy to keep clicking and adding to the shopping cart that many people find themselves dramatically overspending. It's not necessary, after all, to carry the boxes out of the store. Just purchase, submit, confirm, and wait for your goods to arrive. Unfortunately, your credit card bill also arrives.

8 eBay Is A Guessing Game

You can get good deals through the auction process on eBay, buying your electronics from other users, but you can also get a raw deal. Generally speaking, it's rarely a good idea to buy used electronics on eBay because you don't know if the person knows how to ship the product (too much jostling in transit can harm electronics goods),

and you don't get warranties with used equipment. You often have little recourse if the product doesn't work. If you're still determined to buy electronics, however, check the vendor ratings carefully before buying to make sure the seller's reputable and use your best judgment. Of course, if you simply can't live another day without playing your old ColecoVision games, eBay might be the only place to go where you can find a machine to play them on.

9 Customer Reviews Are Mixed Bag

On most online shopping sites, customers can post reviews about the products, and these are usually visible with the product description. You can find useful out-of-the-box information, including whether the product performed as advertised. Often customer reviewers throw an extremely useful jolt of cold water over the "best product ever" claims made by the product hype-writers. Be skeptical, though, because you can't always determine why the customer wrote a review. Sometimes it's clearly to slag the manufacturer; other times it's to complain about a different product from that manufacturer, apparently in an attempt to discourage you from buying. As with everything in life, use your best judgment and do a little more research, such as checking *CE Tips*' online reviews (www.cetips.com).

10 Research Purchases Online

Before going to your store, or while at the store's Web site, search online for reviews of that product and look for published reviews by magazines (again, check the reviews on our Web site at www.cetips.com) and other sources. Contrast these with customer reviews at other online stores. Look up the meaning of the terms used in the product description (sometimes the online store has these available with a mouse click, as well). Take a look especially for published head-to-head product reviews to make sure you're getting exactly what you want.

11 What's In A Brand Name?

Practically every consumer electronics store offers well-known brands and much lesser known—even unknown—brands. You have to decide how important the brand name is to you. If you demand a name brand, such as Sony, you'll typically pay more, but you also know you'll usually get good quality and good service. For less money, you can often get something almost as good, and in some cases every bit as good, although possibly with a less comprehensive warranty, service, and support package. Keep in mind that some companies sell at least two brands, both of which are essentially the same product, but only one bears the recognizable brand name. (Blank CDs are one of many product areas in which this occurs.) Here, too, do your research. Search online, talk to store clerks, and email company representatives.

12 Security Concerns

Credit card theft and identity theft are among today's major fears. In the case of online buying, read the online store's policies for security, privacy, and antifraud protection. If the e-tailer doesn't have anything posted in all of these areas, don't shop there until it does. If the product is too good to pass up, phone or email customer service until you get answers. Be sure all transactions are performed with secure protocols—typically you'll see a padlock or a key in your browser's status bar when you visit a secure Web site—and also be sure to type in only the information required. Leave all optional fields blank; anything the store requires appears in the form of mandatory fields.

13 Evaluate Those Features

Feature-itis is rampant, especially in TVs, DVDs, cameras, and cell phones. It's easy to get caught up in the excitement of having the newest equipment with state-of-the-art features, but stop yourself and ask what you're really trying to accomplish. If you want a high-quality picture when watching TV, you should buy the TV with the best picture you see in the store or buy the one you liked so much at your friend's place the other night. If you don't need a cell phone that takes pictures (costs too much to send them anyway) or that uses voice commands to dial (nice, but how often will you use it?), then don't bother with them. Features are great, but not if you don't need them, they go unused, or, worse, they get in the way.

14 Test Immediately.

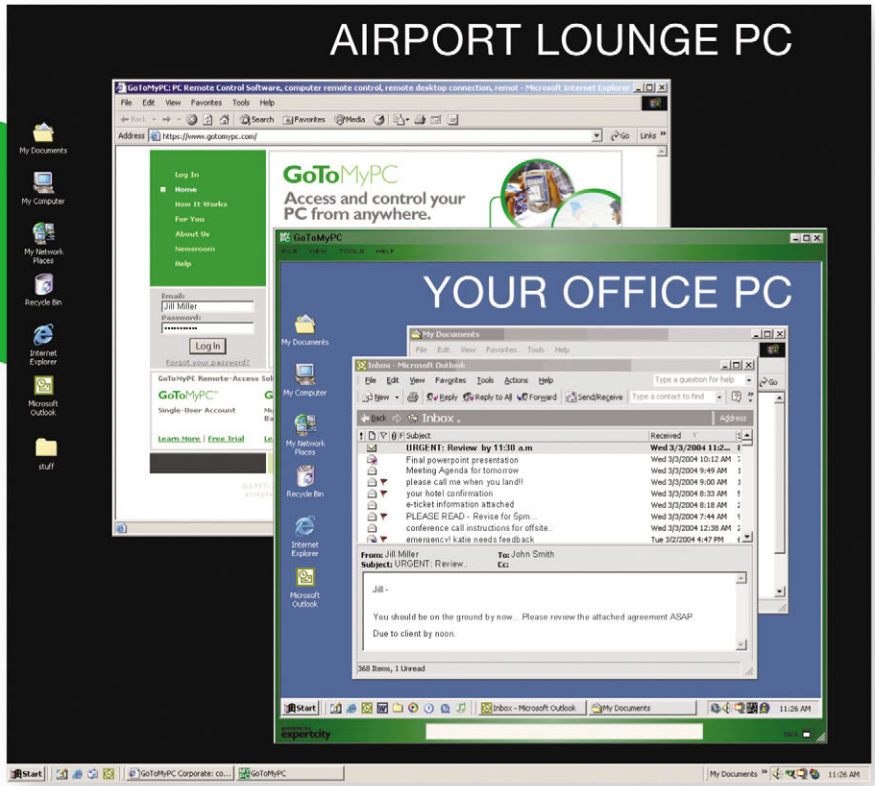
As soon as you get your product home, set it up and test it. If anything is wrong, return it. For the most part, consumer electronics either work perfectly out of the box or there's a problem you don't want to hassle with. The reason is that any flaw in an electronics product means that you'll get not just substandard performance immediately but also additional degradation of performance over time. If a volume control gives you a bit of noise, the noise isn't likely to go away and, in fact, almost always gets worse. If the CD player won't play one of your CDs, chances are it won't play others as you go along. And so on. With electronics, bad generally gets worse.

15 Talk To The Cable Guy

Even with all the wireless goodies hitting the market these days, wires and cables continue to proliferate. You need them for a huge range of electronics products, and more importantly, you need the correct ones. USB cables come with at least two different device-side connectors, one larger and the other smaller, so be sure to check the device before buying. If your DVD has component video outputs, don't forget that they don't handle audio, for which you need additional cables. If there's any way you can, take the device to the store with you or find one on the shelf the same as yours to show the salesperson. And be sure to buy cables long enough for what you need—longer, in fact, to allow room for later changes. CE

BY NEIL RANDALL

GoToMyPC®



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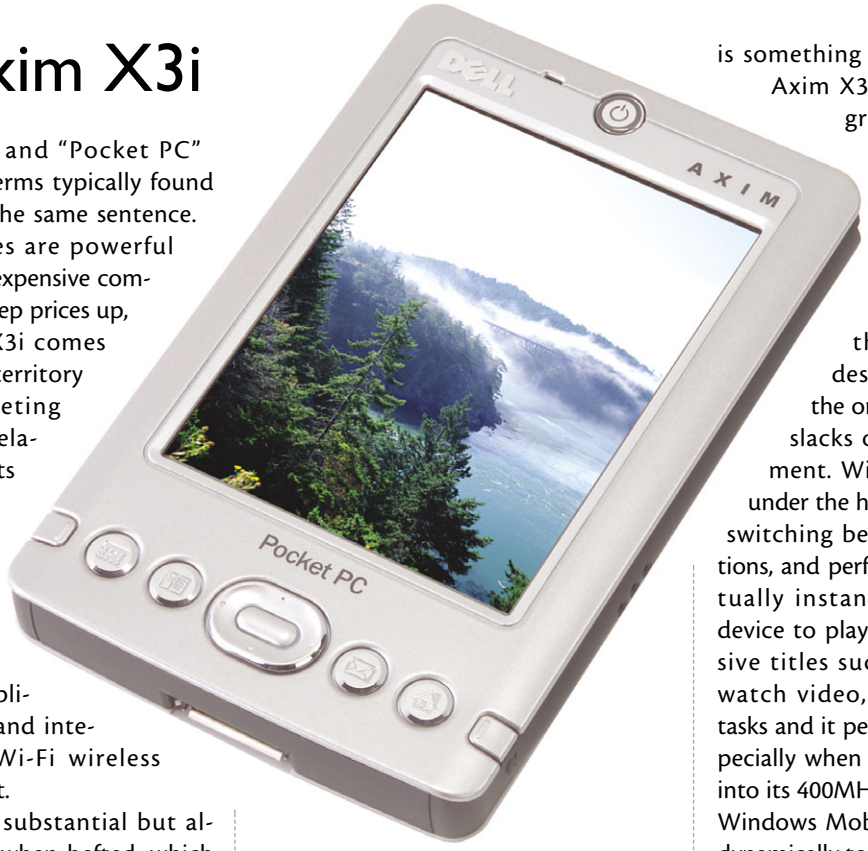
Dell Axim X3i

"Bargain" and "Pocket PC" aren't terms typically found within the same sentence. Pocket PC devices are powerful enough that their expensive components tend to keep prices up, but Dell's Axim X3i comes closer to bargain territory than most competing models do. The relatively low price gets you the fastest processor currently used in Pocket PC devices, a generous 64MB of storage space for your applications and files, and integrated 802.11b Wi-Fi wireless networking support.



Dell Axim X3i

$349
www.dell.com

The unit looks substantial but almost feels hollow when hefted, which is a plus for a handheld device. The jog dial is located on the left side, making it easy to control most of the unit's features with a thumb when it is held in a user's left hand, and a headphone jack sits above the dial for privately listening to music or movies that are copied to the device. Up top there is a slot for SD (Secure Digital) card media, an IR (infrared) transmitter, and a stubby piece of plastic that lights up blue when there is activity during an 802.11b Wi-Fi session.

This integrated Wi-Fi connectivity is one of the Axim X3i's best features, especially useful because the unit uses the Windows Mobile 2003 operating system. Connecting to a wireless network really can't get easier, as the unit automatically detects when it is in the range of an 802.11b network and pops a message up on the screen asking users if they want to connect. Provided the user has the proper permissions to join the network, it is possible to connect with a single tap. In the future, whenever the device senses it is within range of a network that was previously added by the user, it connects automatically, and that's it—you're online.

Of course, most Web pages are designed for screens with higher resolutions that have a wide landscape orientation instead of a Pocket PC's tall portrait orientation, but for the most part Web browsing is surprisingly pleasant. We reduced text to its smallest possible size (it remained legible) and turned off images, and were able to easily read news stories, reviews, message board posts, and other information at our favorite sites. We recommend installing a third-party utility that lets you change the screen orientation to landscape mode for Web browsing, or waiting for devices with the Windows Mobile 2003 Second Edition to appear, as that operating system has built-in support for switching the screen orientation. Posting messages or composing emails is something of a chore because the Axim X3i doesn't have an integrated keyboard, but few Pocket PCs have this feature and it would only add to the device's size and weight.

Web content also takes more time to load than is the case with a desktop system, but that's the only area where this device slacks off in the speed department. With a 400MHz processor under the hood, launching programs, switching between running applications, and performing other tasks is virtually instantaneous. We used the device to play games (including intensive titles such as Age Of Empires), watch video, and other demanding tasks and it performed like a champ, especially when we locked the processor into its 400MHz speed instead of letting Windows Mobile 2003 scale the speed dynamically to conserve battery power.

Text displayed on the Axim is crisp and remains legible even when scaled down to miniscule sizes, but characters still have a lot of jagged edges because of the 3.5-inch screen's low 240 x 320 resolution (a resolution shared by most Pocket PCs, but some models are now shipping with 480 x 640 resolution). We tried to compensate by using the included ClearType utility, which smoothes the edges of fonts and works great with desktop and notebook computer LCDs, but it made the characters too blurry when used with the Axim.

Dell offers a variety of X3i packages and accessories at its Web site, and we recommend at least getting a carrying case for the unit to protect the LCD. Even with a case, an extra battery, and a host of additional equipment, the X3i still costs far less money than most competing models, and those looking to get the most Pocket PC for their buck should definitely take a look at Dell's excellent offerings.

BY TRACY BAKER

Hitachi DZ-MV550A

Hitachi DZ-MV550A

$799.99

www.hitachi.us/tv

Although MiniDV is by far the most popular media used in digital camcorders, products such as Hitachi's tiny DZ-MV550A prove that there are some viable alternatives. This unit records video directly to DVDs, a format that comes with several benefits and drawbacks. In a nutshell, the DVD format makes things slightly more difficult to record but much easier to play back compared to tape formats. It takes a few seconds for the DVD to spin up to speed when the unit is turned on, and it sometimes takes several seconds to begin recording while the camcorder cues up the appropriate spot on the disc. On the other hand, it is easy to create discrete video segments, access them for playback nearly instantly, and watch them in any order as you can access any recorded section of the DVD whenever you like.

The DZ-MV550A is very easy to handle. It's small and sits comfortably in your hand, and the important Zoom and recording Start/Stop controls are at your fingertips. The integrated color LCD pivots and swivels to show precisely what you're recording regardless of the angle at which you hold the camcorder. To conserve battery life, you can instead rely on the camcorder's viewfinder, but the viewfinder is fixed in place, so it's not as comfortable to use as the LCD.

The DVDs used for recordings are not the typical discs used to store Hollywood movies, but are much smaller 3-inch DVD-RAMs or DVD-Rs that hold 1.4GB of data. This allows for a smaller camcorder frame, but dramatically cuts down on available recording time and also on playback compatibility. Few devices can read the smaller discs directly, and at most users can record an hour of video using the lowest quality setting. The highest quality setting allows for only 18 minutes of video and only works when you use DVD-RAMs (although double-sided DVD-RAMs are available that let you record up to 40 minutes of high-quality video).

The camcorder's video quality is adequate but not outstanding, and we noticed a lot of mosquito noise (swirling dots of color) around high-contrast edges, especially in video we shot indoors in relatively low light. All video took on a bluish tint, as did still images. We had to hold the camera rock-steady to get still pictures that weren't completely blurry, and even then image quality left much to be desired, but that's par for the course where digital camcorders are concerned. On the plus side, the autofocus did a fantastic job of keeping objects in focus as we zoomed in and out.

For those who feel that the ability to randomly access video segments is very important, the DZ-MV550A is a good choice. Other than that, it really doesn't offer enough compared to MiniDV cameras to garner a wholehearted recommendation.

BY TRACY BAKER

Sharp DV-HR300U

Sharp DV-HR300U

$799.95

www.sharpusa.com

DVRs (digital video recorders) are changing the way we watch TV, and Sharp combines two of the most popular recording technologies in its DV-HR300U to create a product that in many ways represents the best of both worlds. The recorder saves standard television recordings on an 80GB hard drive that stores up to 100 hours of video using the lowest quality setting, and about 20 hours using the highest quality setting. The hard drive allows for pausing and time-shifting to give users total control over program playback. This is supplemented with a recordable DVD drive that records to either DVD-R or DVD-RW media so users can make permanent backups of their programs or other recorded video.

DVDs hold up to one hour of video recorded at the highest quality settings, or up to six hours using the lowest quality EP setting. Video signals that use copy protection (most commercial movie DVDs and pay-per-view showings) cannot be recorded. Recordings must be scheduled manually or via the integrated VCR+ feature, so in many ways the unit operates like a modern VCR. One highlight, however, is that shows recorded to the hard drive can easily be backed up to DVDs to free up hard drive space for more recordings.

The DV-HR300U has so many options that, unfortunately, it doesn't have a Tivo's ease of use or seamless integration, but gadget nuts will love messing with the various settings. It works well as a progressive-scan DVD player for watching movies, and outputs rich color when connected to an HDTV via the component video outputs. The DV-HR300U does not handle high-definition signals, but for those who still watch standard-format shows on a 4:3 television set, it is difficult to imagine a product that offers this much versatility.

BY TRACY BAKER

Kenwood Excelon KDC-X579

Car audio seems to be the last bastion of "good enough" sound quality. People who wouldn't dream of relying on built-in television speakers for home theater sound limp along with factory speakers and head units every time they get on the road. If you're looking for ways to extend your MP3 collection's range or have had enough muddy, low-powered car audio, an after-market head unit is your best bet. Kenwood's Excelon KDC-X579 will punch up your car's audio at a price you can live with, while keeping the door open for future expansion.

The unit plays commercial, recordable, and rewriteable CDs, plus MP3 or WMA (Windows Media Audio) files from CD-R/RWs. At near-CD-quality (128Kbps [kilobits per second]) encoding, you can fit over 12 hours of MP3 music on a single disc. How's that for a one-disc road trip? The KDC-X579 has an adequate internal amplifier (22 watts per channel rms [root mean square]), and includes four preouts for connecting to an external amp. High-pass and low-pass electronic crossovers divide and direct audio frequencies to the appropriate channels through the amp. The included AMS (Amplifier Manage-ment System) controls compatible Kenwood amps directly from the head unit so you won't have to crawl in the trunk to fiddle with the amp's knobs. Kenwood provides System Q and other tone controls for choosing or creating equalizer profiles for the built-in amp. The Excelon line sports an attractive 12-character multicolor display, in a flip-down faceplate, plus a remote control and carrying case.

We had our friends at AutoSounds in Lincoln, Neb., handle the installation, but the process is straightforward. Insert the unit in a single DIN cavity, connect it using a wiring harness, and you're good to go. There are plenty of ways to expand the system, as well. The unit is SIRIUS-ready, HD Radio-ready, and Music Keg-ready. After installation, take some time to read the manual and configure the receiver to your car's acoustics and your own preferences. It took us a little while to figure out all the menus and options (we'd have appreciated a "Quick Setup" guide to the basics), but it's well worth the time.

Kenwood Excelon KDC-X579

$280
www.kenwoodusa.com

The first thing we noticed when firing up the KDC-X579 was the silver volume control wheel on the front. It's a great concept, though the plastic wheel itself feels cheap and less articulated than we'd expected. The button in the wheel's center toggles between inputs and Standby mode, and the other controls are more or less self-explanatory. The model is easy to control, even when driving, and the Excelon's layout is both intuitive and accessible. The display does a good job of displaying the file and folder structure of MP3/WMA discs, and shows ID3 tag information for each track. The detachable faceplate swings down to reveal the CD slot and Eject button. It's an interesting setup and might save a few millimeters on the front panel, but isn't always convenient when you're driving.

The Excelon's clarity and power overshadowed any minor interface tics, however. We were impressed with the unit's sound quality, compared both to factory equipment and other after-market head units we used in the same vehicle (with Blaupunkt TSx652 speakers). The internal amp's 22W x four channels (rms) provided enough muscle for any music type and delivered a crisp (if somewhat bright) tone. The head unit's front and rear channels were well balanced, and the equalizer controls were robust enough to provide quite a lot of customization.

Kenwood's KDC- X579 is a good way to upgrade your car's sound system and provides plenty of opportunity to continue down the audio improvement path with other after-market equipment. We're interested to see how it integrates with other products and expect to cover a few in upcoming issues. Even on its own, however, this Excelon model provides enough features and enough power to warrant its price. The KDC-X579 will serve as a solid foundation for any midlevel car audio system.

BY GREGORY ANDERSON

CyberHome CH-DVD 300

We can't remember what caught our eye first: this DVD player's diminutive price or its even smaller size. We wondered what features you could get in such a small (and inexpensive) package. The answer is quite a lot.

Despite the CH-DVD 300's budget price and tiny form, CyberHome didn't skimp on the player's functions. It offers progressive-scan playback (through its component video jacks) in addition to interlaced S-Video and composite connections. It also includes 3:2 pulldown, a technology usually found on higher-end models that improves the appearance of films played on your TV by converting the film's 24fps (frames per second) to television's 30fps. The unit also has a digital coaxial output for multichannel sound in addition to standard analog stereo jacks. About the only missing connection is a digital optical jack. And, in addition to standard DVD and CD formats, the CHD-DVD 300 supports MP3 and JPG playback.

Installation is easy. Just connect the DVD player to your display and/or receiver using a set of video and audio cables and power up your components. Spend a minute configuring the on-screen setup menu, especially for televisions that can display widescreen or progressive-scan images. The compact case (8.9 inches wide x 2.1 inches high x 9 inches deep) fits into almost any open slot in an entertainment center.

The full-featured remote control is easy to use, though the buttons are a little small. The on-screen navigation of MP3 and JPEG files and directories is helpful. Any DVD player succeeds or fails based on its image and sound quality. We're happy to report that the CH-DVD 300 exceeded all our expectations (we tested it on both a standard CRT and a plasma TV). The CH-DVD 300's colors are vivid and faithful, outperforming several far more expensive models, its digital audio delivers without a hitch, and its video is sharp on all display types.

Some users report problems with reliability for burned discs and overall longevity, but we didn't experience any trouble with commercial discs after using the player for several weeks. In our opinion, the CH-DVD 300's features and low price are a pretty good value. You have so little to lose and so much to gain.

BY GREGORY ANDERSON

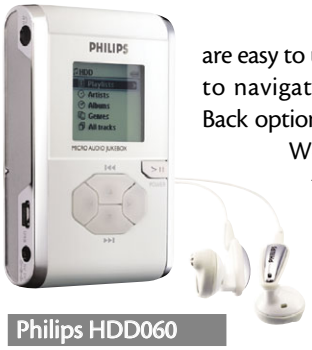
CyberHome CH-DVD 300

$49.99
www.cyberhome.com

Philips HDD060

Portable music players come in all shapes and sizes. Tiny flash-memory players provide portability and durability, but sacrifice capacity and possibly the convenience of a full-featured user interface. Full-sized hard drive players offer massive storage (20GB or more) with larger screens and controls. They're bulkier and more expensive than their diminutive cousins, however. Philips' HDD060 is one of a new breed aiming to bridge the gap between media player models. It's a 1.5GB hard drive-based player, just 3.4 inches high x 2.2 inches wide, with a 1-inch display and large thumbpad.

The HDD060's 1.5GB are enough to store 27 hours of 128Kbps (kilobits per second) MP3 files. That's plenty of capacity for most users. For higher quality listening, the unit supports WMA (Windows Media Audio) files and MP3s encoded at bit rates up to 320Kbps. The unit's compact form factor (20% smaller than an iPod) fits easily in a pocket. Philips claims a 10-hour life for the rechargeable Li-Ion battery, which we found to be accurate. Digital Media Manager software creates playlists and automatically scans your PC's hard drive for media files.



Philips HDD060

$219.99
www.philips.com

Setting up the HDD060 requires a quick installation and a little reading. The device won't recognize music files copied directly to the drive (though you can store data files this way). Installation is easy, though the DMM interface isn't as intuitive as we'd like. And both the application itself and transfers can be sluggish. The USB 1.1 connection doesn't help.

Though the HDD060's sound quality is good, its playback controls aren't always easy to use. The player's Volume controls are easy to use and its menus are easy to navigate, but the Forward and Back options aren't intuitive enough. We found the touch-sensitive Fast Forward and Rewind buttons to be almost annoying to operate. Selecting tunes from the Source menu is relatively easy (you can browse by Artist, Album, Genre, or Playlist), but it's important to have all your metadata in order. As with almost any digital music player, the menu system reads the ID3 tags encoded with MP3 files.

Our verdict is mixed. The Philips HDD060 has enough storage for listeners who want to carry a significant amount of music in a compact player, and its price is competitive with similar models. But we're holding out for a few key usability improvements before recommending it.

BY GREGORY ANDERSON

Kodak DCS Pro SLR/n

$4,995
www.kodak.com

The digital camera industry is one of the most competitive around, and not just among consumer-level products. Top digital camera makers such as Canon, Nikon, and Kodak are fiercely battling for the digital camera high ground: pricey digital SLR (single-lens reflex) cameras designed for professional photographers. Kodak's DCS Pro SLR/n is an excellent example of a digital SLR done right, and any professional shooter would be glad to get his hands on this camera.

Despite the laundry list of features that the DCS Pro SLR/n has, it's hard to avoid focusing on the money aspect of the camera. The DCS Pro SLR/n will set you back a cool $4,995, and that doesn't include any lenses. It would be just as easy to spend a like amount equipping the DCS Pro SLR/n with a suitable arsenal of lenses.

What the DCS Pro SLR/n brings to the table is a selection of features that can make an average photographer good and a good photographer great. Using an SLR-style camera such as the DCS Pro SLR/n ensures that what you see through the viewfinder is what you get. The camera's ultra-sensitive CMOS (complementary metal-oxide semiconductor) sensor capable of capturing images at 14MP (megapixels) underscores Kodak's commitment to putting the best digital camera in your hands that they can.

For digital cameras, the sensor is the star of the show. In the DCS Pro SLR/n, Kodak has integrated a full-frame 35mm CMOS sensor. The value of a full-frame sensor in an SLR digital camera is that a standard SLR lens works the way it was meant to. An SLR digital camera with a smaller, partial-frame sensor magnifies the image that the lens captures. In effect, this increases the focal length of the lens (for example, a telephoto lens at 100mm might actually magnify the image as though it were a 200mm lens) and is usually unwelcome with wide angle or macro lenses. With the full-frame sensor of the DCS Pro SLR/n, photographers regain full use of their detachable lenses.

In addition to the full-frame aspect of the CMOS sensor, the ability to capture 14MP images is stunning. Images are far more detailed, crisp, and clear. Our test prints were very sharp compared to lower-resolution images. Perhaps the only drawback to such a high resolution is the amount of storage space the camera requires. But the DCS Pro SLR/n isn't restricted to 14MP. For subjects requiring less resolution, you can choose resolutions of 3.4MP, 6.1MP, and, of course, 14MP.

Kodak wasn't content to create a camera with a 14MP resolution. It also wanted the sensor to have an ISO range that could cope with a wide range of lighting conditions. You can set the DCS Pro SLR/n's ISO to a setting of 6 to 1600 and set a calibrated ISO range from 6 to 800. The primary difference between calibrated and noncalibrated is in the capture format. You can use a calibrated ISO with DCS RAW, JPEG (Joint Photographic Experts Group) and ERI (extended range imaging) JPEG files. Noncalibrated ISO ranges are limited to DCS RAW format only.

Not only does the DCS Pro SLR/n have a powerful sensor, it has the electronics behind it to enable you to capture footage that was previously impossible with digital cameras. With the DCS Pro SLR/n, you can shoot 1.7fps (frames per second) until the camera's buffer is filled at 19 full-resolution images.

For situations where you need the perfect exposure, the DCS Pro SLR/n features the ERI JPEG format. ERI JPEG is a proprietary Kodak technology that lets you store your images in a smaller format than in RAW format while retaining more of the image's original data than a traditional JPEG image. In addition, the ERI JPEG format provides two stops of exposure latitude, similar to the "bracketing" technique used by film photographers for decades.

The DCS Pro SLR/n also is a model of sound ergonomic design. Even though it weighs over 2 pounds with battery (but no lens), the DCS Pro SLR/n is well-balanced and intuitive to use. Its lithium-ion batteries are expected to last up to 700 exposures, depending on your usage habits.

We loved the DSC Pro SLR/n. Without a doubt, it was one of the finest digital cameras we've evaluated. With the ability to use Nikon lenses (or Canon lenses with the SLR/c model), photographers who have invested in a set of lenses can feel comfortable knowing they won't have to replace the tools they've become accustomed to. If money is no object, then we heartily recommend the DCS Pro SLR/n. If the DCS Pro SLR/n's price tag is too rich for your blood, rest assured that its features will eventually trickle down to more affordable digital cameras.

BY CHRIS JACKSON

Philips 15PF9936 HDTV

Most people associate HDTVs with gargantuan widescreen televisions that dominate a living room. And until recently, this perception was accurate. However, with Philips' release of the 15PF9936 15-inch HD-capable LCD set, this stereotype has been turned on its head.

Why make a set so small? Not everyone can afford to devote the space required for a large HDTV set. Other users want to put a small screen in a den, office, or in the kitchen. In these niches, a 15-inch LCD set is perfect. And with the eventual migration from analog television broadcasts to a purely HD world, it makes sense to equip your LCD with the capacity to display HD content.

Philips is cleverly riding the coattails of the computer industry's infatuation with LCD monitors. As the prices drop on LCD panels used for computer displays, consumers looking for LCD TV sets benefit. Computer users have long been enjoying displays with resolutions that make analog TV show its age.

Philips 15PF9936 HDTV

$799.99
www.philips.com

Part of the appeal of HD content is the widescreen format, and the 15PF9936's 4:3 format requires either stretching the image or displaying letterboxes around HD broadcasts using the 16:9 format. Although we hated to sacrifice screen space by using the widescreen format, we found the full-screen format hard on the eyes. But for non-HD content, the full-screen format was fine.

This Philips television includes DCDi (Directional Correlational Deinterlacing) circuitry by Faroudja that improves image quality by cleaning up image artifacts that can occur when a film is transferred to videotape.

In addition to serving as a go-anywhere HDTV, the 15PF9936 does double duty as a computer monitor, with resolutions up to 1,280 x 1,024.

Although the 15PF9936 does a respectable job as a small, thin TV, we can't recommend it to consumers looking for the wonders of HDTV on a small screen. With only 15 inches to work with, the limited amount of screen real estate makes widescreen content far too small and unsatisfying for a television that costs $799.99.

BY CHRIS JACKSON

Digital Innovations Motorized GameDR Xcelerator

You know the type. The friend who borrows your favorite DVDs, only to return them with scratches that render them unplayable. Or the child who thinks that video game discs are perfect Frisbees. With the amount of money we spend on disc-based entertainment, repairing the scuffs and scratches discs suffer from everyday use is becoming more and more important. If you find that your CD-ROMs, DVDs, CDs, and video games are too short-lived, Digital Innovations Motorized GameDR Xcelerator may be just what you need.

Devices such as the GameDR solve a chronic problem of optical disc media by repairing scratches. Because optical discs rely upon a laser to read data off the disc, scratches and other blemishes can render a disc unreadable. The GameDR may be able to resuscitate your favorite CDs, DVDs, or game discs, provided the scratches on the discs are not especially deep.

Using the GameDR is straightforward. Spray the disc with a cleaning solution, attach it to a spindle, and insert the spindle into the GameDR. Plug the GameDR in and flip its handle-mounted switch, and a small motor spins into action and re-surfaces your disc. After repeating this process, you buff the disc with a small felt pad.

We were skeptical of the GameDR when we first unpacked it. It's simply built from plastic, with little effort to make it look "cool." However, we were surprised when it resurrected several CDs that had previously given our CD player fits. Of course, your success rate may vary depending on the amount of damage to your discs. Yet if you've made a significant investment in CDs and DVDs, we recommend the GameDR as a handy tool for coping with wear and tear on your disc collection.

BY CHRIS JACKSON

Digital Innovations Motorized GameDR Xcelerator

$49.99
www.digitalinnovations.com

Canon PowerShot Pro1

A year ago it looked like the megapixel wars were ending, with 5MP (megapixel) and 6MP cameras topping the consumer-level selection. Then, Sony announced its 8MP Cyber-shot DSC-F828. Now, Canon has released its first 8MP PowerShot, the Pro1.

One of the most eye-catching features is the Pro1's 7.2mm to 50.8mm (28mm to 200mm equivalent in 35mm photography), and f/2.4 to f/3.5 L-Series lens. This is the first PowerShot to sport the professional-quality L-Series lens that features fluorite and UD (ultra-low dispersion) glass.

The Pro1's 2-inch, 235,000-pixel LCD flips open on a 180-degree hinge and then twists forward through a 270-degree range. This reduces the stretching, stooping, and neck-bending sometimes required to frame shots.

The Pro1 has a hefty 7X optical zoom as well as 3.2X digital zoom. Although the back of the camera is similar to the G5, Canon rearranged many of the buttons for easier operation. For example, the navigational button is now next to the LCD, within closer reach of the right thumb. One of the best improvements to the camera body, though, is the addition of a backlit status LCD. You can see camera settings, the battery indicator, and the number of shots remaining, even when you're shooting in dark conditions.

Instead of an optical viewfinder, the Pro1 has an EVF (electronic viewfinder), which shows the image as the CCD (charge-coupled device) image sensor sees it. There are pros and cons to using an EVF. Using the EVF will consume battery power. On the other hand, it provides an excellent way to see on-screen menus when it's too bright outside to view the LCD.

The Pro1's zoom mechanism is very quiet compared to that of many cameras. The camera's zoom operation is also rather unique. Rather than pressing a pair of zoom buttons on the camera, you twist a ring on the barrel, just as you would with an SLR (single-lens reflex) camera. However, whereas 35mm SLRs have a smooth, mechanical zoom that you can precisely control, the Pro1's zoom ring is connected to an electric zoom mechanism that moves in increments.

The Pro1's BP-511A lithium-ion battery pack is one of the best camera batteries, providing power for hundreds of shots from a single charge. A battery charger, lens hood, remote control, USB cable, and A/V cable come with the camera. The Pro1 also features a built-in hot shoe for attaching an external flash.

The Pro1's mode dial has two Custom mode settings. Here you can store groups of camera settings for quick access. For example, we saved the ideal settings for outdoor macro photography at the C1 position and the ideal aperture, shutter speed, and ISO for shooting action shots during volleyball matches at the C2 position.

Canon PowerShot Pro1
$999
www.powershot.com

A 64MB CompactFlash card comes with the Pro1 and holds six RAW images at 3,264 x 2,448 pixels or 17 highest-quality JPEG (Joint Photographic Experts Group) images. The Pro1 is PictBridge- and DPOF (Digital Print Order Form)-compatible for direct printing with compatible printers.

For the most part, the Pro1's image quality is excellent, but the camera is more prone to noise (visible specks or discolored pixels, often in the darker portions of an image) than other Canons have been. A glimpse at the camera's CCD provides an explanation. The Pro1's CCD is the same size as that of most 5MP cameras. In order to fit an additional 3 million pixels into the same space, each of the 8.3 million pixels must be smaller (and therefore able to register less light). Adjusting the ISO, shutter speed, and aperture can help combat the noise.

Similarly, you'll have to make some adjustments in aperture and lens position to fight chromatic aberrations (purple halos around lights). It's worth noting, though, that the Pro1's images do not display nearly the level of chromatic aberrations that the PowerShot G5's images did.

Compared to the Pro1's 4-inch minimum focusing range with Macro mode, the camera's Super Macro mode lets you shoot from just half-an-inch from a subject. You can take great close-ups using Super Macro, but an AF-assist (autofocus-assist) lamp could improve results.

Canon's PowerShot Pro1 is a well-designed camera with a full set of manual functions. If you are ready to move to 8 megapixels, the Pro1 should be one of your top choices, as its image quality is much better than that of some others, such as the Sony's F828. However, there is still some room for all manufacturers to improve upon the new 8MP technology.

BY KYLEE DICKEY

Apple In-Ear Headphones

Apple finally offers iPod users an alternative to the tinny-sounding earbud-style headphones that ship with iPods. Although the trademark white and gray design matches the iPod, these headphones work equally well with any device with a 1/8-inch headphone jack.

Bass response varies considerably, depending on how well you get the earphones to seal around the ear canal. Users who do not achieve a full seal will complain of tinny sound and a lack of bass response. After following the instructions in Apple's KnowledgeBase (docs.info.apple.com/article.html?artnum=93655), we could feel the earphone's silicone seal to the ear canal. We then got great bass response, and we could lower the volume to one-third of its normal level. The headphones blocked out ambient noise, producing a similar result to using more expensive noise-canceling headphones.

Whether you love or hate these headphones comes down to whether you can get a proper seal. We let several people try them, and some got beautiful, full sound, while others could never achieve a solid seal. If your ears are the right size and shape, it takes only a little practice to insert the earphones properly. However, the silicone caps tend to gradually slide, necessitating periodic adjustment to maintain bass response.

A square, white case holds the headphones and spare earphone caps. The headphones come with three sizes of silicone caps so you can find the pair that fits best. The 29-inch cord wraps around the outside of the case, and a clear lid holds everything in place.

Apple In-Ear Headphones

$39
www.apple.com

Not surprisingly, the Apple heaphones do not offer as much bass response as in-ear headphones that cost two or three times as much. But Apple's 'phones are affordable and sound better than the standard iPod headphones.

Everyone's ears are different, and although three sizes of caps are included with the In-Ear Headphones, not all ears will accommodate the necessary fit. If the earphones fit your ears properly, this is one of the best pairs of budget in-ear headphones you'll find for your iPod. However, it's best to buy from a retailer that will accept a return if you cannot get the desired seal and bass response.

BY KYLEE DICKEY

Memorex OptiFix Pro

Almost everyone owns at least one damaged disc (CD, DVD, or video game). With proper care, discs shouldn't get scratched, but accidents happen, especially if there are young children in the house. Memorex's OptiFix Pro is a device that cleans and repairs discs.

The OptiFix Pro looks like a portable CD player and has just three buttons: Clean, Eject, and Repair. The package also includes an AC adapter, a spray bottle of cleaning solution, a tube of repair solution, two cleaning pads, two repair pads, and a plastic case to hold the cleaning and repair supplies.

The purple cleaning pads are designated for repair use, and the yellow cleaning pads are designated for cleaning use. You place the appropriate pair of pads in the slots inside the OptiFix Pro and add a couple of drops of the repair solution on the right pad.

To clean a disc, spray the cleaning solution directly onto the disc. The OptiFix Pro shuts off automatically at the end of the cleaning process (less than a minute) or the repair process (about two minutes).

Memorex says that you may need to wipe excess solution from the disc using a Memorex OptiCloth ($3.99), which is not included. A clean microfiber or lens-cleaning cloth should work just as well. You should also replace the pads after 15 to 20 uses. A package with a pair of cleaning pads and a pair of repair pads costs $4.99.

We cleaned a couple of CDs and repaired a couple of CDs and DVDs using the OptiFix Pro. The damaged discs were quite prone to skipping before the repairs. Afterwards, all of our discs played without skipping. However, if the disc's scratches are too deep and penetrate its reflective surface, the OptiFix Pro will not be able to repair the disc.

Memorex OptiFix Pro

$29.99
www.memorex.com

We had fabulous results with the OptiFix Pro. However, as we would with any product that alters the surface of a disc, we suggest that you start with your most damaged discs first. This way, you know that the unit you bought is free of defects before attempting to repair a disc that has just one or two scratches. If you have the same experience with Memorex's OptiFix Pro that we did, you should be able to salvage quite a few of your scratched CDs, DVDs, and games.

BY KYLEE DICKEY

CE Face-Off

PC DVD Recorders Burn Up The Tracks

Maybe you think you're keeping pace with the digital age with your little 3.5-inch floppies and your fancy compact-disc writing machine. And maybe you are, for now. But mark our words: There will come a day when little Tommy comes running into the study crying and blurts out "Dad, Austin says his dad can burn 4.7GB of data or video at 4,000 kilobytes a second, and he says you can only transfer 650MB at a time is it true is it true?" And what will you tell little Tommy then?

That's right, you'll tell him to take the plastic to Best Buy and come back with an 8X multiformat burner and a box full of media. But before you call him a cab, hand Tommy a copy of this article and help him sound out the words. For Tommy's benefit, we review here five top-of-the-line multiformat DVD burners, both internal and external, for price, design, performance, and features: the Memorex True 8X, TDK 880N, LaCie 8X DVD±RW (USB 2.0 version), Plextor PX-708A, and Sony DRU-530A. All of these devices handle DVD+R/RW, DVD-R/RW, and CD-R/RW with a top DVD burning speed of 8X. In case that doesn't mean much to you, we'll take a moment to run through some background information about DVD formats and speeds.

The LaCie 8X DVD±RW looks pretty but is light on substance.

Formats & Speeds

The DVD industry entered a golden age of profitability in 1997, at which time Panasonic's DVD-RAM and Pioneer's DVD-Rs were approved and standardized by the DVD Forum, a consortium of DVD manufacturers that helps guide the DVD industry. DVD-RAM, the most robust rewriteable format even to this day, permits up to 100,000 rewrites without degradation and includes run-time write verification/defect management (other formats require time-intensive software intervention for write verification), and can be read to and from on the fly just like a hard drive. With expensive media (on the order of $10 a pop) and low compatibility, DVD-RAM remains a high-end product for data-critical applications, but the format is taking hold in home theater systems and some camcorders, so it won't be too many years before your gramma wants one for Christmas. Once-recordable DVD-R enjoys much wider popularity, particularly in its General Use format (the other DVD-R authoring format is intended for professionals). DVD-RW (rewriteable 1,000 times) plugs the gap between DVD-RAM and DVD-R.

In late 1998, a group of manufacturers, including HP, Sony, Mitsubishi, and Philips, declared (off the record) a Format War and, after a long wait and much fanfare, finally brought to market the DVD+RW in 2001. Obvious similarities notwithstanding, +RW (and +R) improves on the DVD-RW format in a couple of (albeit fairly minor) ways. +R/RW includes hardware-supported write verification, like DVD-RAM, and supports lossless linking, which makes discs encoded from variable bit rate files more compatible with standalone DVD-ROM players.

One more remedial lesson before we get to the reviews, this time on burning speed. What's with all the X's, as in 8X, 4X, 2.4X? And does a 16X CD burner outrun a 4X DVD drive? The answer to the second question is definitely not: 1X DVD speed means a data transfer rate of 1,385KBps (kilobytes per second); 1X CD speed means 150KBps, about a factor of 9 slower. Most experts agree that you won't get a top-quality burn out of a drive's highest setting. You'll get fewer errors if you use slower settings, though occasionally burning too slowly seems to be problematic, as well. For best results, back off an X or two from high gear.

The Driving Range

We ran a number of comparison tests on the drives we reviewed, concentrating on the drive's ability to write data to DVD-recordable media. We timed each of the drives as it wrote a 500MB directory to a DVD+RW at 4X and a DVD+R at 8X. We also wrote a 1.05GB video file to DVD+R at 8X on each drive. All of the drives tested can record to CD-Rs and CD-RWs, of course, but not at the same speed (we'll note the fastest speed at which each drive records to this media). As with two of our DVD tests, we timed how long it would take each drive to record 500MB to a CD-R/RW when using the drive's fastest recording speed, so this test obviously favors the drives that can record at higher speeds. Each score reported here is either the best or the average of three burns. Our testbed is a PC running Windows XP Home Edition on an Ath lon XP 1500+ processor at 1.33GHz with a 3dfx Voodoo3 graphics card and 512MB of RAM. And without further ado, the reviews.

LaCie 8X DVD±RW

$219 FireWire/$189 USB 2.0
www.lacie.com

There are no color banners emblazoned with big red 8X's on the outside of the LaCie 8X ±RW box. Understatement is the most elegant self-promotion. The minimalism extends to the drive's documentation, as well. The only paper in the box is a little leaflet illustrating the installation process, not even any indication that the drive actually has a name. Installation of this FireWire- or USB 2.0-compatible external drive is plug and play, so we don't really need a long-winded discussion, but we generally like to see at least one page of users manual for every $50 of product or so. (The manual is on the installation CD.) This steel-gray brick is a landmark design in the International style engineered by F.A. Porsche, designer of tasteful brushed-chrome pens, cigarette lighters, and other paraphernalia for the discerning materialist.

But enough about looks. The LaCie drive is actually a thinly-disguised Pioneer DVR-107D drive. The drive's DVD stats, in brief: 8X for both DVD+R and DVD-R, 4X for ±RW; the DVD read speed is 12X. Its CD reading/writing abilities are solid if not top-of-the-line: 24X for CD-R and 16X for CD-RW.

LaCie favors Roxio's authoring/mastering suite, Easy CD & DVD Creator 6. The kit includes AudioCentral, a music collection manager; Disc Copier; Creator Classic; and Drag-to-Disc. The Creator Classic makes MP3, WMA (Windows Media Audio), and WAV CDs; VCDs (Video CDs) and Super VCDs; mixed mode and enhanced discs; and backups. It also supports overburning, or recording more data to the disc than its official limit (CD manufacturers always build in a little margin). A successful overburn squeezes extra music or data into a project, but overburning can wreck the CD and maybe even the drive. The LaCie drive supports **disc-spanning** (writing large files across more than one disc), as well, and includes a label creator. Disc Copier, not surprisingly, copies (non-copy-protected) discs. AudioCentral is a fairly modest jukebox with indexing, burning, and ripping capabilities and support for hardware MP3 players.

The LaCie drive may look like it was designed by a Porsche, but it didn't run like one. It finished last or next-to-last in all of our tests but one (its best 8X +R recording time, which was third among all the drives we tested, was 1:14 [minutes:seconds]). The drive's best recording time in the 4X +RW test was 2:07, last among the drives we reviewed, and its best recording time during the video test, at 2:32, also finished at the back of the pack. The LaCie 8X ±RW drive is a mediocre CD recorder, finishing third in the CD-RW test and fourth in the CD-R test. However, in most cases the LaCie drive finished a mere handful of seconds behind the top-performing drives in our tests.

Memorex True 8X DVD Recorder

$129.99
www.memorex.com

The first thing we noticed when we opened the Memorex box is the included analog audio cable, absent from the packaging of so many of True 8X's peers. That's good. The drive itself is typical, on the outside at least, and comes in standard black and silver or white guise. Performance-wise, the True 8X is a jack-of-all-trades, master of none; it boasts an 8X burn for both DVD+R and DVD-R and 4X for the two RWs, all read at 12X. That's top of the line. However, we has some difficultry recording faster than 4X on a DVD-R burn, even on Memorex-brand 8X media. Aside from this glitch, though, the True 8X put in a solid performance.

The True 8X comes bundled with the popular Nero 6 suite of authoring and mastering tools, a cluttered attic full of programs for burning, authoring, editing, label creating, diagnosing, and organizing. (The titles are Express 6, NeroVision Express 2, InCD 4, BackItUp, NeroToolkit, Showtime, Recode 2, Cover Designer, and StartSmart.) Our installation was a little rough. For some reason, the InCD program was left out, along with some manuals, but no major harm done there. Occasionally Nero Express refused to burn a disc on the grounds that a second application was accessing the drive; this second application invariably turned out to be another Nero module mysteriously switched on. The InCD icon in the System Tray also threw us for a loop for a while when it refused to acknowledge our vigorous double-clicking. In the end, we recommend actually reading the manual, particularly for InCD (which performed as advertised once we got the hang of it). But basically, Nero is sound.

The True 8X finished second in the DVD+R 8X burning tests with an average time of 1:23 and a best time of 1:11. The

Plextor tears up the competition for CD burning and manages decent DVD-recording times, as well.

Our winner is no rock star, but the Memorex True 8X puts in a respectable performance across the board, yet costs less than the other contenders.

The Sony DRU-530A can go 10 rounds with any device on our list. It's particularly recommended for users who burn mostly CDs or video to DVD.

drive also did well during the video test (2:31 for third best in average recording time and 2:11 for second place in best recording time), although the drive stumbled slightly in the 4X +RW test (third and fourth finishes for average and best recording times). The Memorex drive didn't do so well in the CD-recording tests. In the CD-RW test, for example, the True 8X finished fourth behind the LaCie drive, despite the fact that the LaCie's top CD-RW speed is 16X compared to the True 8X's 24X. The Memorex drive's top CD-R recording speed is only 24X (compared to 40X for the Plextor and Sony units), so it's not surprising that the drive finished last in this test, as well, with an average recording time of 2:53.

Overall, the drive performed well considering its price. It's the least expensive unit we reviewed, yet consistently beat most of the higher-priced competition in our DVD tests. Beyond its spin speed, the True 8X's features are pretty typical.

Plextor PX-708A

$189
www.plextor.com

A nondescript internal drive (it comes in black or white) for the no-nonsense professional, the Plextor PX-708A is all business. The PX-708A is the only device on our roster with a headphone jack and volume control on the faceplate. It also supports overburning, and the Plextor drive switches to silent mode automatically when a commercial DVD-Video (that is, one protected by CSS [content scrambling system] encryption) is popped into the drive. The recorder ships with the Roxio software suite, described above, in addition to a trial version of Dantz Retrospect, a data backup utility.

Overall, the Plextor recorder finished in the middle of our pack during our speed tests. The PX-708A performed well in two of our three tests (4X +RW recording and the video-recording test), finishing second in average time, as well as best time in both tests. However, the drive tanked during the 8X +R recording test, finishing last in both average time (with a pokey score of 1:51) and best time (1:21). The Plextor did redeem itself somewhat when we tested its CD-burning ability. The drive finished first in both CD-RW and CD-R testing. Not bad overall.

The TDK drive, champion of DVD data burning, should be first choice for those with lots of information to move around.

Sony DRU-530A

$179.99
www.sonystyle.com

This conventional-looking internal DRU-530A from the originators of dual-format drives is an elder statesman of multiformat burners by now and is soon to be upstaged by a Dual Layer-capable model, but it still holds its own in our grueling derby. With the latest firmware, this model features 8X DVD+R and -R writing, as well as 4X DVD±RW recording.

Sony thumbs its nose at Nero and Roxio and ships its players instead with Sonic-brand authoring/burning software. The titles include Sonic RecordNow, with burning, ripping, and copying functionality akin to Easy CD & DVD Creator; Sonic MyDVD, authoring software for simple video capture, editing, and menu creation; and Sonic DLA, a drag-and-drop application like Nero's InCD or Sonic's Drag-to-Disc. Also in the box are the respected Cyberlink PowerDVD DVD playback software and MusicMatch Jukebox for your MP3 archival needs.

The Sony drive struggled in two of our three DVD-recording tests but performed very well during the +R video-recording test, in which the drive had the fastest average time at a mere 2:22. The DRU-530A also finished with the top best time, at 2:06, when recording video. Clearly, this drive likes the movies, but it's not quite as comfortable working with data. In the 4X +RW test, the drive finished fifth in average time and third in best recording time. The numbers were not much better during the 8X +R recording session, in which the drive had the third best average time and finished with the fourth best recording time. However, like the Plextor drive, the Sony DRU-530A handled the CD-recording tests well, finishing second in the CD-RW competition and tying Plextor for first in the CD-R sprint. This isn't terribly surprising given that only the Sony and Plextor drives can record to CD-Rs at 40X, unlike the other drives we reviewed.

TDK Indi DVD 8X 880N

$369.99
www.tdk.com

This external drive (also FireWire or USB 2.0 connectible) comes in a smooth dark gray and black box that's well-dressed and capable but doesn't clamor for attention, like a senator at a State of the Union address. When the disc spins up, a distant hum (not too loud, less than

How To Burn A Video To DVD

It's pretty easy to put your AVI (Audio-Video Interleaved) or MPEG (Moving Picture Experts Group) video files on DVD so you can shuttle them among PCs. Turning your home videos into a presentation that's watchable on any old DVD player is a little trickier. DVD players only read discs in the DVD-Video format, which mandates that video be encoded in MPEG-2 and stored with a retinue of mysterious accessory files in a folder called VIDEO_TS. You could try to populate this directory yourself, or you could run a cheese grater back and forth across your knees all afternoon, which is less painful. Instead, let's put the burden on the Nero program that came with the Memorex drive, our round-up winner.

1 Fire up NeroVision Express 2 from the StartSmart console.

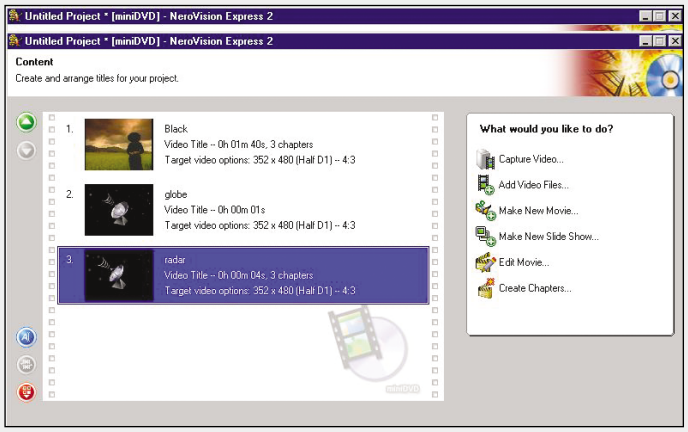
2 Choose Burn Video To DVD from the What Would You Like To Do? menu. You can also choose to make a miniDVD or a Video CD. If you don't have these options, you're missing either the proper hardware (for example, no DVD burner) or Nero's DVD Plug-In, which encodes video to the MPEG-2 format. DVD authoring won't work without this little module, which comes free with Nero's Ultra Edition 6 but may not be on your system if you use an older version of Nero. It's available for download for $24.99 from www.nero.com.

3 Click the Add Video Files option and browse your system for files in the AVI or MPEG format. Pick as many as you want. Click Next.

4 As you add videos, you can divide them into chapters by clicking the Create Chapters button. Long videos in particular should be split into chapters for easy navigation later.

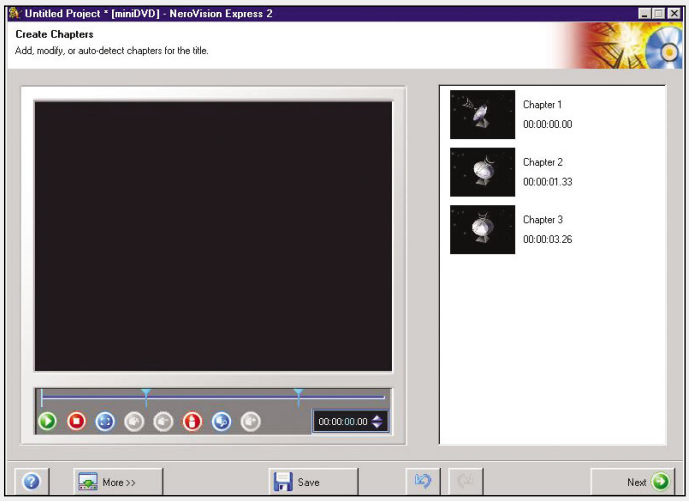
5 Make simple edits to your videos by highlighting them and selecting the Edit Video option. Here you can trim sections from the video; add titles and text effects; and append clips with wipes, fades, and other transitions.

6 At any time, click the More button at the bottom of the screen for video (PAL [Phase Alternate Line] or NTSC [National Television Standards Committee], aspect ratio) and audio (stereo or surround) options. You'll need the MultiChannel Plug-In (also free with Ultra 6 or $17.99 otherwise) to work with surround sound.



7 Click next to move on to the Create Menu dialog box. Choose a menu template and customize the pictures, text, and layout. Video Title will get its own menu item on the Main Menu; clicking that item takes you to a submenu of all the chapters you defined.

8 Click Next again to test drive your project with the simulated remote control.



9 Move on to the Burn options, stick a disc in the tray, and loose your laser.

That's it. Pretty effortless. The curious may now open their new discs in Windows Explorer and examine the extensions (.BUP for backup, .IFO for information, .VOB for video object) on all those files in the VIDEO_TS folder. Put the cheese grater back in the drawer.

Most-Wanted Features

DVD burners are pretty simple creatures, really. With speed as the selling point, most other features get lost in the noise. Nevertheless, here are three things to look for when you're shopping for a DVD recorder.

Compatibility. Why bother choosing between a DVD-recordable drive that supports either DVD-R/RW or DVD+R/RW when you can have one that supports both? A record-everything drive helps protect your equipment from obsolescence in case one of the DVD-recordable formats goes the way of Betamax.

Bundled Software. For simple tasks, most CD- and DVD-authoring software is alike. If you're planning to do a lot of DVD mastering or recoding or if you're making specialized discs, though, you'll care more about what software comes with the drive. Of course, you can switch software after you've bought the hardware, but if you're the picky type, read some reviews first and factor the software bundle into your decision. Keep in mind, though, that drives sometimes ship with a Special Edition version of the software rather than the full-featured version.

Speed. We had to put it in here. Recording speeds of 12X are nearly upon us, and the DVD Forum and Alliance aren't likely to slow down any time soon. If you must have one today, demand nothing less than 8X for ±R and 4X for ±RW. ■

45dB [decibels]) and faint tremors suggest a quiet and confident power, a nuclear reactor on your desk. The Indi DVD is another manufacturer on the bleeding edge of the X-curve: 8X for DVD±R, and 4X DVD+RW. DVD-RW burning is billed as a disappointing 2X, but the drive actually burned it twice as fast.

The Indi DVD includes left and right analog RCA audio jacks on the back but no headphone jack and volume control on the front. The drive has a SpeedRead feature that spins the drive slower when copy-protected video is detected (to cut down on the noise); you can disable the feature by holding the Eject button down for three seconds on an empty tray.

TDK clearly knows how to make a fast drive. The results of our testing were unequivocal: TDK won every DVD-burning category but one. Oddly enough, it limped into last place on that final DVD test, the 1.1GB video file transfer, with an average time of only 2:55. And, to further restore the balance, it loses ground on CD burning, finishing last in CD-RW testing (4:14 average time) and third place in the CD-R test (2:59 average time)—a bit embarrassing considering the 880N's price. The drive only records to CD-RW at 24X and CD-R at 32X, which is slower than some of the other drives we tested. The Indi DVD takes a few liberties with the CPU, as well: 38% CPU usage when recording at 4X, compared to about 25% for most of the others.

And The Winner Is

Actually, there was no all-out winner when the dust settled. LaCie wins on style; TDK kicks serious tail in the DVD department but drops the ball when it comes to CDs, and the price tag is hefty. Plextor is ahead of the class in CDs (still very important for many users, particularly considering the economical price of the media). Sony and Memorex fall somewhere in between all the extremes, and between the two we favor the Memorex True 8X drive. Not the most exciting choice, but just look at its price compared to the other drives. For $129 you get a solid performer and a solid deal. CE

BY RYAN TURNER

Time Trials

We ran several tests on each drive and recorded the drive's best time and average time after three burns. As you can see, no single drive dominated the tests. Most drives did well in one or two categories but performed poorly in others.

	LaCie 8X DVD±RW	Memorex True 8X	Plextor PX-708A	Sony DRU-530A	TDK IndiDVD 880N
4X +RW					
Average	2:21	2:13	1:51	2:33	1:47
Best	2:07	2:04	1:46	1:58	1:39
8X +R					
Average	1:41	1:23	1:51	1:30	1:14
Best	1:14	1:11	1:21	1:15	1:03
DVD video					
Average	2:51	2:31	2:27	2:22	2:55
Best	2:31	2:11	2:11	2:06	2:23
CD-RW					
Average	3:24 (16X)	3:26 (24X)	3:15 (24X)	3:19 (24X)	4:14 (16X)
Best	3:17	3:18	3:04	3:14	4:05
CD-R					
Average	3:35 (24X)	3:34 (24X)	2:53 (40X)	2:53 (40X)	2:59 (32X)
Best	3:34	3:33	2:53	2:52	2:59

Jasc Software Paint Shop Power Suite Photo Edition

If you are new to digital photography, you can choose from a variety of all-in-one software suites that let you organize, edit, and distribute your digital pictures. On the other hand, experienced users who want more than point-and-click red-eye removal tools and slideshow features generally use individual applications (often from different publishers) to create their photo-editing lineups. Thanks to Jasc's new bundle, software-savvy photographers can buy the publisher's most heavy-hitting applications in one package, and first-timers can train with the same software they'll use when they graduate from newbie-dom.

Tools Of The Trade

Paint Shop Power Suite Photo Edition includes the popular Paint Shop Pro 8 photo-editing application, Paint Shop Photo Album 4, Animation Shop, and Paint Shop Xtras: Creative Edition 1 and 2. Unlike Roxio's Easy Media Creator 7, which includes a custom interface that lets you launch programs by task, Photo Edition installs each program separately and doesn't offer any features that tie the applications together. That said, the bundle includes a worthwhile extra: "Paint Shop Creations: Demystifying Digital Photography." This 140-page, picture-laden book provides plenty of photo-taking tips and information about using Photo Edition's applications to edit pictures.

If you've used Paint Shop Pro before, you already know that it's a powerful photo-editing tool. As with its counterpart, Adobe Photoshop, Paint Shop Pro's sheer size will panic first-time digital artists. Dozens of Toolbars and Palettes ring the edges of the GUI (graphical user interface), and thanks to the two Xtras: Creative Edition packages, the application boasts tons of special effects. Paint Shop Pro opens the Learning Center Quick Guides window by default; newbies can read about basic tasks, such as Resize An Image or Make A Photo Look Old. Experienced users will quickly adjust to version 8's (slightly) streamlined interface and can dive right into its more powerful features.

Jasc Software Paint Shop Power Suite Photo Edition
$149
www.jasc.com

Some of version 8's most important new tools include Background Eraser, Seamless Tiling, Straighten, and an enhanced Text tool that lets you change individual character formatting. The Eraser section's Background Eraser color samples your background, identifies strong edges, and then removes only the nearby background colors. For example, if you run the Background Eraser across a photograph that includes a person and a sky background, the Background Eraser will remove the sky without damaging the person. It's not foolproof (it clipped our person's shoes in the example), but it beats removing the background pixel by pixel. The Background Eraser isn't limited to single colors, either. If your picture's background has multiple colors (for example, a rocky area), the Background Eraser will identify the color pattern and erase it as easily as it erases solid colors. As with the Eraser tool, you can specify the Background Eraser's brush size and opacity.

Paint Shop Pro includes Animation Shop, which lets you turn a plain old GIF (Graphics Interchange Format) image into animated Web art, whether you buy the individual application or the Photo Edition bundle. Xtras: Creative Edition 1 and 2 are separate packages that provide hundreds of Picture Tubes, which are ready-made images. You can use Paint Shop Pro to edit these images and then add them to your own pictures. The Xtras packages also include additional masks and patterns.

A New Image

Paint Shop Photo Album 4 handles the other half of the digital photo process: organization and distribution. Because Photo Album is normally a standalone product, it also offers some basic image-editing features. You can add borders and frames, convert your pictures to black and white, and, of course, correct the red-eye effect. Experienced users can create most, if not all, of these effects with Paint Shop Pro, but new users might stick to the basic tools when editing important pictures until they learn their way around Paint Shop Pro.

You can easily organize your digital image and video files from within Photo Album, thanks to its Browse window and large thumbnails. We love the Panorama feature, which meshes individual pictures into a larger photo. You can use it to create a true panorama shot of a single object or location. Photo Album also includes a basic but useful slideshow feature. Once you're ready to send your masterpieces to the masses, you can use Photo Album to put your pics in an email message or burn a VCD (Video CD), complete with a Menu screen.

Overall, Photo Edition makes a powerful package that covers all of your photo-editing bases for about $49 less than the cost of the individual products. And as always, Jasc provides free, unlimited technical support.

BY JOSHUA GULICK

Magix Music On CD & DVD

If you're looking for software that justifies buying a new DVD-RW drive, Magix has just the program for you. Not surprisingly, Magix's Music On CD & DVD lets you burn music and video to CDs, but if you want to create extra-large music and custom music video discs, you'll need a DVD's storage capacity. Music On CD & DVD can import music from storage media and record music from your stereo or the Internet.

Music On CD & DVD's GUI (graphical user interface) breaks into two sections. The Music On Audio CD & DVD section handles only digital music tasks, such as audio disc and MP3 disc burning. The Music On Video CD & DVD section lets you add video clips and visual effects to your songs. It also lets you create a menu, complete with animated buttons, that displays your disc's playlist. Unfortunately, the program's main interface only appears when you start the program; if you want to return to the main menu from a project, you'll need to open another instance of Music On Audio CD & DVD.

Both the Music On Audio and Music On Video sections provide a Timeline area that resembles a digital video-editing application's timeline feature. Music On Video's interface includes a small window that lets you preview (or pre-hear) your creations. The software also has several visualizations, including a twisted, pulsating tree that grows and shrinks to the beat of the music. You can drag and drop the visualizations, digital images, and video clips directly onto your Timeline songs. If you want more special effects, you can add visual transitions.

The software also has automatic features that can smooth your project's rough edges. The Cleaning Wizard automatically removes crackles, clicks, hisses, and noise from your songs. If you want to clean the songs yourself, you can use the wizard's Manual Analysis option, which lets you listen to the cleaned song before applying settings.

Magix Music On CD & DVD
$39.99
www.magix.com

Once you finish editing your project, you can burn it to a CD or DVD. Video projects that have a menu require a DVD, but Music On CD & DVD can burn audio CDs, MP3 CDs, and even menu-free video projects to a CD or DVD. You can use the software's included MP3 encoder 23 times, but then you'll need to pay $14.99 to unlock it.

BY JOSHUA GULICK

Audio Recording Studio

Although most media players can rip music from audio CDs, many don't have advanced recording features that let users record from other sources. If you want to record audio from a VCR or tape player, for example, you may need different software. To that end, Recording Software offers Audio Recording Studio, a small, easy-to-use program that performs the tasks a basic media player can't.

The Audio Recording Studio program records any sounds that your sound card receives or creates and then converts the recording to MP3 or WAV format. If you want to record audio from your stereo or a VCR, you simply plug the device's cable into the sound card's Line In port (or if you have volume trouble, the card's microphone port), play the audio, and click the program's Record button. You can also use Audio Recording Studio to record audio from your media player. If your media player can't convert other digital music formats to MP3, you can use Audio Recording Studio to create an MP3 copy.

Recording Software Audio Recording Studio
$29.95
www.recordingsoftware.net

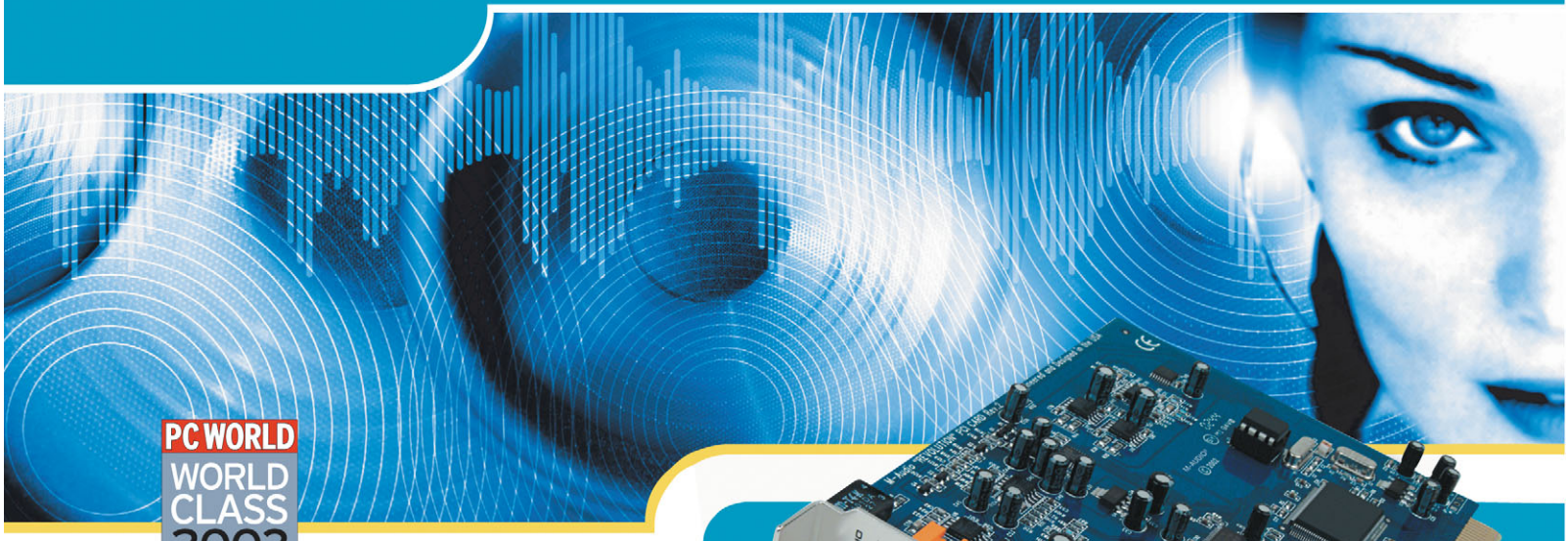
Thanks to a handy Voice Activation feature, Audio Recording Studio pauses when it encounters dead air. As a result, you can speak, pause for a few seconds, and then speak again without recording the dead air. This doesn't completely avoid dead air, but it means the difference between 20 seconds of silence and two.

We like the software's simple GUI (graphical user interface). The interface displays all of your recordings and lists each file's date, duration, and file path. The Settings menu lets you specify MP3 bit rates (64-bit to 256-bit) and schedule one-time, daily, or weekly recordings. Unfortunately, Audio Recording Studio doesn't offer an important option. Although you can choose a default output folder, you can't name the files. Audio Recording Studio automatically generates a name that includes the recording date and then tosses the file into the output folder.

We like being able to record from so many sources, but we shouldn't have to sift through hundreds of similar file names. You can use Explorer to rename your files, but we'd like to see a feature that lets you name your recording on the fly.

BY JOSHUA GULICK

Hearing is Believing



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Cheap Speakers vs. The High Price Of Hi-Fi

Do You Really Get What You Pay For?

Let's say you're in the market for new stereo speakers. Or maybe you've decided it's time to build that surround-sound setup to go with the DVD player you bought a couple of winters ago.

You can walk into your local electronics megastore, hand over $400, and walk out with everything you need, from A/V receiver to speakers to subwoofer, in one convenient bundle. Try the same thing at the audio specialty shop across the street, and you could lay out the same amount of money on speaker wire alone.

$400 at your local megastore can get all the speakers you need for a home theater setup.

As far as you can tell, that $400 bundle sounded absolutely great at the store. Besides, you're setting up a rec room, not a dance club. Is the extra-expensive equipment really worth what it costs?

The answer is yes, but possibly no. Then again, it depends.

In this article, we'll discuss what you should expect to get for your money, and we'll offer a few things to consider when deciding how much you really need to spend on speakers. See the "Glossary Of Terms" sidebar for explanations of unfamiliar terms.

Less Is More, Except When More Is More

Many enthusiasts feel that speakers are the most important component of any audio system. After all, you can spend as much as you want on preamps and processors, or on a Dolby Digital/DTS receiver, but the best signal in the world still is only as good as the device that makes it audible.

But what really makes an expensive speaker better than a cheap speaker?

One of the premium indicators of speaker performance—and one of the most commonly misunderstood specifications used to sell speakers—is frequency response. In basic terms, frequency response measures the range of frequencies a speaker can reproduce within a specified margin of error. We'll discuss the "range" part first and then move on to the "margin of error" part.

The range of human hearing is generally accepted as somewhere between the frequencies of 20Hz to 20KHz. In speaker specifications, frequency response is most often expressed in this context. For example, a three-way floor speaker may be touted as having a frequency response of 36Hz to 20KHz. But this expression of a speaker's overall dynamic range may tell you only so much about how one speaker compares to another.

Arguably, the more substantive aspect of frequency response, and the aspect that separates some high-end speakers from some entry-level products, is the speaker's capacity to accurately reproduce the frequencies across this 36Hz to 20KHz spectrum. Herein lies the margin-of-error component.

Imagine frequency response expressed as a line on a graph. In theory, the better the speaker, the flatter its frequency response (in technical terms, the less deviation, in decibels, between the sound waves produced by the speaker and the frequencies contained in the source signal).

$160 vs. $400 vs. $2,000. What's the difference?

You can take your own informal measure of frequency response by listening to how naturally a speaker reproduces midrange tones such as human voices. As a rule, the flatter a speaker's frequency response, the closer the speaker comes to reproducing

sound realistically, or at least as it was recorded, with nothing added and nothing lost.

In these terms, you can pay a lot of money for nothing. Engineering high-fidelity frequency response requires high-performance testing equipment and facilities; a manufacturer needs to be able to accurately capture and measure sound in order to improve it. As with any product, retail prices tend to reflect the amount of research and development a company puts into its technology.

Pricier speakers may use refinements such as gold-plated five-way binding posts instead of spring-loaded clip connectors.

More Power? Say Watt?

In general, there's a direct correlation between price tags and power ratings with most audio components. On the other hand, power handling tends to be another misdirected speaker specification.

We're not saying more power isn't better, but the fact is, at normal listening levels, speakers are damaged by a lack of amplifier power more often than by too much power. Granted, everybody has a different yardstick for normal listening levels, but power doesn't harm speakers nearly as readily as distortion.

You can produce distortion by running too much power into a speaker that isn't equipped to handle it. On the other hand, one of the deadliest types of distortion, especially to high-frequency transducers, is the kind that occurs when an amplifier doesn't have enough power to drive a set of speakers efficiently, buckles under the load, and begins clipping.

If you buy one of those all-in-one home theater bundles, you can generally be reasonably assured that the receiver and the speakers are suited for each other (even if the speakers themselves aren't necessarily state of the art). If you're adding new speakers to an older amplifier, or if you're piecing together a system as you have the time and means, it's more important to make sure your amplifier/receiver can drive your speakers efficiently than to buy the most expensive speakers you can afford.

The Art Of The Sound Of Science

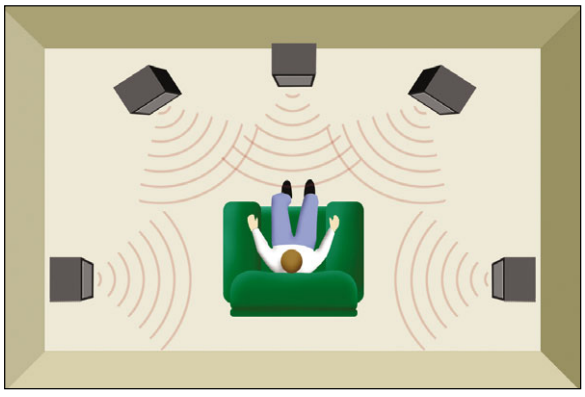
Other indicators of speaker performance include factors such as dispersion and imaging. Specifications, such as sensitivity and impedance, play a role in overall performance when considered in relation to the amplifier or receiver you'll be using.

Theoretically, high-end speakers use top-of-the-line materials and advanced engineering in key areas, such as drivers, crossover networks, and even bindings and cabinet construction, to achieve the best combinations of all desirable characteristics. But there may be any number of subjective factors that determine which speakers are right for you.

The kinds of music or movies you prefer may favor one speaker over another, and the size and acoustical characteristics of the room you plan to put the speakers in probably will, too. The uncompromising audiophile will tell you never to make your decision until you've auditioned a set of speakers in your home environment. This strategy, although sound enough in theory (no pun intended), may or may not be feasible for the average consumer. Besides: What if you move?

At the end of the day, picking the right speakers is a lot like choosing a wine: It all depends on your palate. If you can't tell a difference between a $100 speaker and a $500 speaker, it could be because your ear isn't refined enough to hear what you're not hearing. Then again, it could be because the $100 speaker sounds as good as the $500 speaker. Or it could be that your home décor is sleek and European, and the $100 speaker has an imposing space-age cabinet design that would stand out like a sore thumb among the rest of your stuff, predisposing you to favor the sound quality of the $500 speaker for no greater reason, and perhaps no worse a reason, than outward aesthetics.

We recommend setting a budget before you set foot in a store. Only audition the equipment that fits that budget (and don't be seduced by strategic showroom layouts that place speakers outside your budget next to the speakers you can afford). You'll almost certainly be happy with your purchase once you get the speakers home and installed—unless you happen to be what the retail industry calls a "cost-no-object" consumer. In that case, don't take our advice. Let's face it: You didn't need this article in the first place. CE



No matter how expensive the speakers, placement in the listening environment affects factors like dispersion and imaging.

BY SEAN DOOLITTLE

Glossary Of Terms

Consult the following glossary for more information about terms used in this article.

audiophile—The kind of person who shudders at the suggestion that you don't need the Z series Monster Cable and may succumb to facial tics at the thought of an integrated crossover. In other words, a major enthusiast. If you qualify, you can skip the rest of this article.

bindings—Also known as posts or terminals, the connection point for speaker wire on a speaker or amplifier/receiver. Higher-end components often use gold-plated five-way binding posts that accept a wide variety of connections and provide maximum surface contact between post and wire (more surface contact equals better signal transfer). Less expensive components may use spring clip or "guillotine" style bindings, where the wire is pushed through a hole in the terminal and secured by releasing the spring-loaded clamp.

cabinet—Also called an enclosure, the box that houses the various components of a loudspeaker (drivers, circuitry, etc.). Although cabinetry is important to external aesthetics, good speaker manufacturers treat cabinet design as an acoustical component in and of itself, part and parcel with overall speaker performance.

clipping—A form of distortion that occurs when an amplifier cannot meet the power load required by a speaker, resulting in a square or clipped waveform that can be very damaging to a speaker, especially to the tweeters (high frequency drivers). To prevent clipping, it is better to use an amplifier that meets or exceeds the power handling capabilities of your speakers, thereby reducing the chance of driving the amplifier into an overload or clipping state.

crossover network—Circuitry that divides an audio signal at specified "crossover frequencies" and sends the pieces to the appropriate speaker or driver. For example, a three-way speaker's crossover network may send the highest frequencies to the tweeter, the middle frequencies to a midrange driver, and the low frequencies to the woofer. A high-quality crossover network helps produce a smooth, balanced frequency response.

dispersion—The radiation pattern of a speaker; the way a speaker distributes sound. Even though most speaker arrays produce a sweet spot where listening is optimal, a good speaker also will produce wide dispersion; that is, it will deliver strong sound to listeners in different spots around the room.

distortion—In general, any undesired audio signal that interferes with a source signal. Distortion is most often discussed in the context of high signal levels—specifically, when an audio or power signal goes beyond the nominal handling capacity of a given component. Prolonged distortion can be very damaging to speakers and components. One form of distortion is known as clipping.

imaging—The ability of audio components to create the illusion of a realistic, 3D soundstage. For example, when right and left speakers produce a good stereo image of, say, a jazz performance, you should be able to sit in the sweet spot, close your eyes, and imagine the position of all the players and instruments. In a home theater setup, surround speakers should produce an effective 360-degree soundstage. Factors such as proper speaker placement in the listening environment and speakers that are tonally well matched to one another generally maximize imaging capabilities.

impedance—A measure (in ohms) of the amount of resistance a speaker produces against the electric current coming from an amplifier or receiver. The lower the impedance rating, the more power an amplifier or receiver is required to produce to drive the speaker. We recommend shopping for speakers that feature a nominal impedance rating of around 6 or 8 ohms, a good all-around rating for most modern consumer amplification components.

power handling—The maximum amount of incoming power (measured in watts) a speaker should receive (as estimated by the speaker manufacturer). Audiophile opinion differs when it comes to the importance of this rating. At moderate listening levels, for example, depending on impedance and sensitivity, a 75-watt speaker may be less likely to be harmed by a 400-watt amplifier than by a 25-watt amplifier, due to the distortion caused by clipping.

receiver—An all-in-one component that serves as a separate preamp (switching and processing incoming audio signals), amplifier (amplifying an outgoing audio signal enough to drive speakers), signal processor (decoding surround sound format for home theater setups), and tuner (receiving radio broadcasts).

sensitivity—A measure (in dB, decibels) of speaker efficiency, or how well a speaker turns an incoming power signal into outgoing sound waves. The higher a speaker's sensitivity rating, the less amplification power (in watts) the speaker requires to produce a certain sound level or volume. For all-around compatibility with modern amplifiers and receivers, we recommend shopping for speakers with a sensitivity rating of 86dB or higher. ■

Hollywood Hieroglyphics

Let's Decipher DVD Symbols

You choose a DVD from the shelf, flip it over, and read the blurb to see what it's about. This blurb, of course, provides evidence of 18 thumbs up and a level of cinematic enthusiasm not seen since Edison unveiled the Kinetoscope, but you reject the fluff and absorb the essence like a pro. Moving outside the blurb, you notice a plethora of symbols on the rear cover, all looking quite official and techy. What do they mean?

The Basics

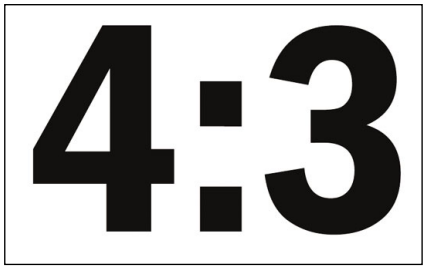
Leading off the list, in the upper-right corner, is the ubiquitous barcode. The bars form a machine-readable version of the number at the bottom of the code. This number is unique to not only the DVD title, but also the version or edition, as well. Retailers use it to manage inventory and sales. You can use it to manage your DVD collection with software, such as DVD Profiler (www.dvdprofiler.com). When you add a DVD to your collection by inputting its barcode, the software goes to the DVD Profiler database (on the Internet) to retrieve the title, cover images, and other details about the DVD.

This symbol represents the most fundamental description of the DVD, its primary format. Movies will be DVD-Video, while DVDs intended for computer use are DVD-ROMs.

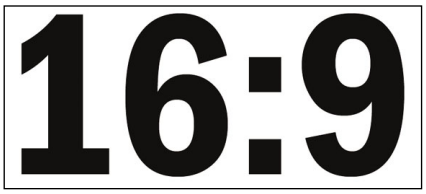
To add a twist, many DVD-Video movies also have DVD-ROM special features that you can only access via computer. And, if your computer can access DVD-ROM features, it can also play the DVD-Video movie, provided you have the required playback software.

Stay In Shape

Next up is the all-important symbol for **aspect ratio**, the ratio expressing the width-to-height relationship of the DVD's image area. Traditional, standard-definition TV has a width-to-height ratio of 4:3 and is commonly referred to textually as full screen or with this symbol:



Widescreen content, shaped more like a movie theater screen instead of an old-fashioned TV, is a little more confusing. Widescreen TVs have a width-to-height ratio of 16:9, and DVDs with content designed for these TVs are called widescreen, as well. They may even have a 16:9 symbol.



In reality, however, few widescreen DVDs actually have content in an exact 16:9 (or 1.78:1) aspect ratio. The more common aspect ratios are 1.85:1 and 2.35:1, but they all look great on TVs that can handle 16:9.

Where On Earth?

Both DVDs and players differ from geographic region to region, resulting in a lack of compatibility between DVDs in the United States and those in Europe and elsewhere. The United States is in Region 1, as are Canada and U.S. territories, which is represented by the preceding symbol.

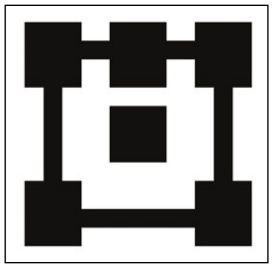
Usually, discs from other regions won't play in a Region 1 player, so be sure you check the region code, especially when buying DVDs through mail order or over the Internet. The DVD won't feel like a bargain if you can't play it when it arrives.

Symbols Of Sound

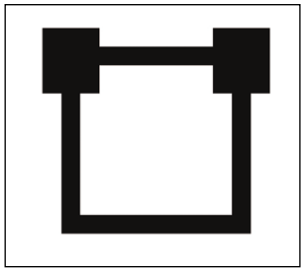
The world of DVD soundtracks is a competitive place, filled with bewildering symbols and jargon. Most new DVDs have at least a Dolby Digital 5.1 soundtrack, with six discrete channels of digital audio: front left, front center, front right, rear right, rear left, and subwoofer. (If you don't have a subwoofer, you can turn off this channel, which incorporates its portion of the signal into the main channels.) The following symbol indicates the presence of this soundtrack:

All new home theater receivers are capable of playing back a Dolby Digital 5.1 soundtrack. Many DVDs also provide a DTS soundtrack, an alternate six-channel digital audio format developed and licensed by Digital Theater Systems.

DTS fans claim that it produces an aural experience superior to Dolby Digital. Not surprisingly, Dolby Digital fans claim the reverse. Both sound great. In order to play back a DTS soundtrack, your home theater system will have to have a DTS decoder.



This symbol denotes a 5.1-channel digital soundtrack, either Dolby Digital or DTS. This style convention also describes other soundtrack variations, such as this representation of a two-channel stereo soundtrack:



The Big Picture

Decoding this matrix: This movie is in color, about 90 minutes long. It has an English soundtrack in Dolby Digital 5.1 and a French soundtrack in Dolby Surround. If you don't have a home theater receiver capable of Dolby Digital playback, you can use the DVD player's analog stereo outputs for playback through either a stereo receiver or a receiver that supports the older Dolby Pro Logic surround-sound scheme. Subtitles are available in both English and French, and the movie can be played back in either full screen or widescreen.

Aren't We Forgetting Something?

Amid all this explanation, we've not yet addressed the meaning of the DVD acronym itself. That's because there is no official meaning. The most common story is that in the early days of development of what was considered a "high-density compact disc," DVD stood for Digital Video Disc. Those who saw a bigger future for DVD than just video opposed the name, and the phrase Digital Versatile Disc was coined, though never officially adopted. The DVD Forum, a group of manufacturers that work together on standards, finally put the issue to rest in 1999 by declaring that the official name was simply the three letters, DVD. ■

Victim of much misunderstanding, THX is not an alternate soundtrack format that competes with Dolby Digital or DTS. Instead, THX is a protocol of sorts, a standardized set of minimum criteria that must be rigorously adhered to in order to display the THX logo; its goal is to ensure a consistent experience of excellence anywhere the THX logo is displayed. Developed and owned by George Lucas' company, the first movie shown under THX certification was "Return of the Jedi" in 1983. THX standards are now available in high-quality home theater gear.

THX also has a newer standard: THX Ultra 2, which expands the old 5.1-channel standard to 7.1 by adding a pair of channels that feed speakers on the left and right sides of the home theater.

More Fine Print

Speaking of standards, the NTSC (National Television Standards Committee) standard is the video format used in the United States. The NTSC is a U.S. committee responsible for creating technological television and video standards, including refresh rate and color capabilities. All DVDs, videotapes, and respective players adhere to the NTSC standard.

In Europe, many countries use the PAL (Phase Alternate Line) video standard. This is the television standard most commonly used in Europe (with the exception of France). Using PAL, the TV's resolution is 625 lines and has a frame rate of 25fps (frames per second).

The CC symbol indicates that the DVD is closed-captioned, offering an optional on-screen textual display of the dialogue and sound effects for people with hearing impairments.

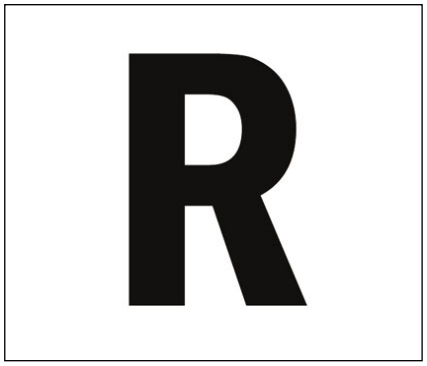
Ratings: What They Mean

In 1968 a film ratings board, called the Classification and Ratings Administration began rating movies. Among other criteria, the board considers nudity, theme, violence, sex, and drug use before giving a movie a rating. The following symbols are fairly well-known, and they're a good gauge for parents who want to prevent their children from viewing inappropriate content.

G—Considered appropriate for all ages, family films.

PG—Parental guidance suggested; may not be suitable for children.

PG-13—Stronger content than PG; parents warned strongly that it may not be suitable for children under 13.



R (Restricted)—You must be at least 17 or accompanied by an adult guardian.

NC-17—You must be at least 17, period.

BY JERRY HATCHETT

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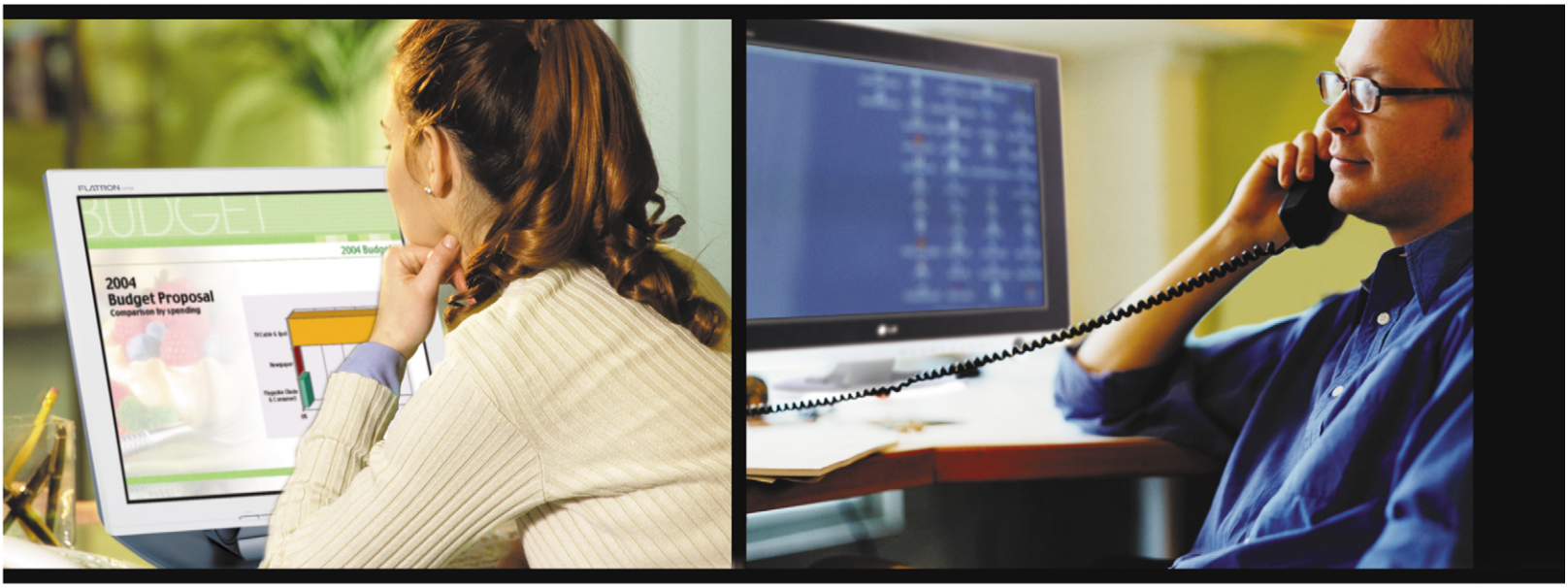

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Life's Good

A/V Project

Get A Grip On Cable Management

When you bring home a brand-new addition to your home entertainment family, cabling is usually the last thing you think about. But when you attempt to set up the new device, making sense of the mess in back is probably the first headache you'll run into. Why do we pay so little attention to cable management? And how can you tame the beast after it's already running wild? We'll discuss some cable management strategies (and highlight some tools) you can use both before and after setting up your system.

But why bother? Does cable management matter if you don't change or move components often? Has your cat ever run behind the stereo? Have you ever had to move the TV to make way for the vacuum cleaner? Organizing your cables and moving them out of the way can do more than just make those chores (and others) more convenient. You'll also limit the risk of pulling something onto the floor or ripping something out of the wall, damaging the components you painstakingly pieced together over the years.

A little cable management goes a long way.

Tie Up Loose Ends

Let's start small. If nothing else, some very basic techniques can help you clean up a snarled mess of wires and figure out which cable goes where. First, collect some thin labels. Masking tape will do, as will general office labels with sticky backs. Any office supply store will carry a selection of thin, adhesive labels in varied colors. RadioShack (www.radioshack.com) sells self-laminating markers dedicated for the task, starting at $1.99 for a sheet of 24. Next, start unhooking everything, cable by cable. As you detach each item, write the device and jack it came from near the end of the label (leaving an equal amount of space at the end for more writing). For example, a composite video cable from your AV receiver could be "RCVR—Vid2," and a digital optical cable from your DVD player could be "DVD—AUD Out." Wrap the label around the cable just beneath the plug so the writing is legible from above. It's helpful to color-code your markings or the labels, dedicating a different color to each device. Continue this process, disconnecting everything. Don't forget to label the power cords at the outlet or power adapter.

Eventually, each cable will have a label on each end. Now, in the blank space after the first piece of information, add the information from the label at the cable's other end. Both ends of the cable will now display where the cable plugs in and where it's coming from.

Connect everything again, starting with the cable that has the shortest distance to span. It isn't necessarily the shortest cable, but it's the easiest one to move out of the way, especially after the next step. As you change

Labeling cables is the first step to making sense of the maze behind your media center.

and add components, keep labeling your cables. Labels are cheap and easy to make, and the eventual time and hassle savings far outweigh the initial cost and effort.

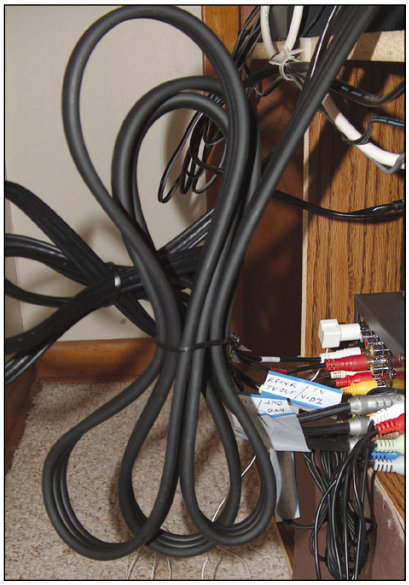
Keep Things Under Wraps

After taming the existing tangle and labeling everything, start thinking about prevention. The best way to keep cables from getting tangled is to limit their access to each other. Tying off excess lengths takes care of entanglements in tight spaces. Enclose cables and wires in tubes or conduits to protect them from environmental hazards (vacuum cleaners, pets, and curious children) and keep them out of sight. Any home theater setup is much more impressive without visible wires snaking around the room.

Loop and clip cables in close quarters. Take any slack in wiring from one component to another in the same cabinet or shelf, create tight loops, and secure them with twist or cable ties. Office supply stores often carry cable ties, and hardware stores stock them in their electrical supply aisles. Additionally, several companies (including Belkin; www.belkin.com) sell packages with dozens of color-coded, multisized, dedicated cable ties for under $10. For more fluid setups, look for reusable Velcro-style wraps, which you

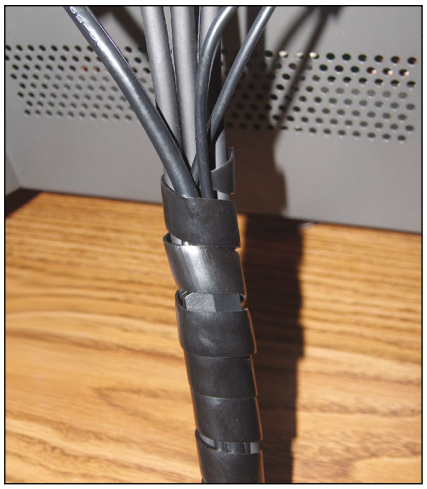
can remove and replace more easily than ratcheted plastic ties. In the future, when shopping for cables, buy the shortest length that will cover the distance between components. Leave a little room to reconfigure, but there's no need to buy 12-foot component cables for a DVD player sitting in a cabinet beneath the TV. You'll pay extra for the privilege of having more wire to untangle.

Next, you'll want to move cables and loops out of the way with cable clips. Most clips attach to a wall or furniture with adhesive backing or small nails. Run the cables through the clips and clip them back out of the way. As an alternative, you can collect groups of cables that follow similar paths and wrap them together in flexible tubing. Look in the electrical or cabling section of your local hardware store for tubing with a split down the middle (imaginatively called split tubing) or conduits that are wrapped or braided with a spiral slit along their lengths. Enclosing groups of cables with these tubes further decreases the clutter and limits the potential for snarls. The series of AV cables running to and from a VCR or receiver are good candidates for this treatment. As your system evolves, move cables in and out of these conduits to keep things under control.



Loop and bunch extra lengths of cord with plastic cable ties.

It's now time to take care of exposed cables that connect to remote components, speakers, and power sources. For some types of wiring, you can use a ruler or thin stick to push the wires under baseboards or carpet. Be careful not to damage the wires' coating (or your woodwork). Most types of cords are just too big to squeeze into such small spaces, however. Consider rectangular raceways or channels as low-cost and hassle-free alternatives to drilling into walls. When you move or upgrade your components, you'll appreciate the flexibility. You might want to paint the channels or raceways to match your walls, cut them to fit the room, and match them with elbow and other joints to provide a perfect fit. Look for them at your local hardware store or search the Web for online retailers. Wiremold (www.wiremold.com) sells CordMate kits in various colors and sizes, which include all the runs and special pieces for nearly any room.



Wrap groups of cables in flexible conduits to avoid tangles and clear space.

For speaker connections, consider flat wiring with an adhesive backing (again, ingeniously dubbed flatwire). Run it along the wall, paint over the wire, and

The Cable Guy

Here are three steps you can undertake to cure cable madness.

1. Label Everything (Time: 30 minutes; Cost: $2 to $5)

Buy some labels. Unhook everything, marking where each end of each cable connects. Put it all back together and smile next time you need to figure out which wire goes where.

2. Tie The Cables (Time: 40 minutes; Cost: $10 to $15)

Salvage ties from the cords of new electronics or packages of trash bags. Or, better yet, buy some cable ties. Loop long cables and tie them at top and bottom. Bunch shorter cables and tie them in the middle. Clip the bundles out of the way and note that you can actually see some floor behind the entertainment center.

3. Wrap The Wires (Time: 60 minutes; Cost: 50 cents to $2 per foot)

Buy some plastic conduits. Collect groups of cables running to and from the same components with round flexible spans. Wrap all your VCR cables in a single conduit, for example. Look for styles split along their lengths; pry them open and put the cables inside. Hide cables that run along the walls with raceways or channels. Paint the conduits first, attach them to the walls, and lay the cables inside. Now, you have all that wiring that no one will even notice. ■

Hardcore cable management involves junction boxes, faceplates, and wall jacks.

connect the ends to your speakers' connections or to a junction box at the terminating points. Mycableshop (www.mycableshop.com) sells several varieties of flatwire for as little as $1.35 per foot. When you need to move or add components, just replace the wires (and repaint where necessary).

Behind The Walls

Ambitious DIY-types always have the option of running cable through walls or under floors. The former is generally easier, though it isn't much of an option without a basement or crawl space offering access to the floor from below. First, cut a hole in the wall (about 8 to 10 inches from the floor) next to a stud. Then drill a hole through the floor inside the wall (using a long drill bit inserted at an angle) and feed the wire into the basement. An unbent coat hanger works well as a rigid guide to pull the wire down; thread the end of the wire into a junction box, attach the box to a stud, and connect the wire to the back side of the jack on the faceplate. Repeat the process where the wire emerges (using the hanger to pull the wire up into the second hole). Attach your components to the faceplates to complete the process. This method is most common for running speaker wire, but it's equally effective for creating outlets for Ethernet, analog AV, or coaxial connections.

If running wires through the basement isn't an option, consider doing something similar from the attic. (Drop each end of the wire down the inside of the wall from above and hook it with a bent hanger from each respective hole in the wall.) Enclose the wire running through the attic in a protective conduit or channel to avoid environmental damage or tripping.

Finally, if you have to run wires through the wall, remove the baseboards, cut a thin channel along the bottom of the drywall, thread the wire along the bottom of the wall and into the channel, and reinstall the baseboards (covering your cuts). Again, thread the wire up and down from the junction box using a rigid wire. For all three construction-related options, check local building codes to make sure you're in compliance with electrical and other regulations. And plan well; you can't afford to drill too many holes in the wall just because you're rearranging the furniture. CE

BY GREGORY ANDERSON

Basic Supplies

Labeling kits are precut and easy to write on.
Radio Shack ($1.99 per 24-pack; www.radioshack.com)

Thin, flat speaker wire attaches directly to the wall.
Taperwire (from $135 for 100 feet; www.mycableshop.com)

Plastic conduits hide and contain groups of wires.
CordMate Kit (from $10.99 for 9 feet; www.wiremold.com)

Cable ties make it easy to coil long wires and tame unruly snarls.
Belkin ($6.99 per 52-pack; www.belkin.com)

Cable clips hang runs of wiring and looped cable out of the way.
3M Cord Clips (from $2.99 per 4-pack; www.3m.com)

Junction boxes sit flush with the wall and provide connectors for almost any connector you want to use.
Carlon SuperBlue boxes (from $50 each; www.carlon.com)

Utility knives cut wires, plastic, and anything else in your way.
Stanley (from $4.99; www.stanleytools.com)

Faceplates and jacks link up RCA, phone, CAT 5, coaxial, or speaker connectors.
Leviton Quickport (from $3.50 each; www.leviton.com)

Cord Organix markets a complete cable management kit through its distributors.
Cord Organix ($10; www.cordorganix.com)

CableOrganizer.com is a one-stop online resource for cable management doohickeys of all shapes and sizes.
CableOrganizer.com (www.cableorganizer.com)

Out Of The Box

Breaking In Isn't Hard To Do . . . If It Needs To Be Done At All

Most people, if they've ever bought a new car, should be familiar with the concept of the manufacturer's recommended break-in period. This is usually an advisory to not drive over a certain speed until you've logged a certain number of miles to give the car's mechanical components time to adjust to the stresses of the road.

Less well-known is that some audio components and accessories also have a recommended break-in period, a transitional phase before the gear starts delivering optimal performance.

However, unlike the break-in period for automobiles, there's very little hard scientific data backing up the case for audio break-in (also known as burn-in). It's based more on empirical observation and anecdotal evidence. And to say that, in some circles, that it's a contested issue is an understatement to say the least. Explore the topic online on most any audiophile bulletin board, and you'll usually see the discussion degenerate into a snotty brawl with opposing camps digging in and casting aspersions on each other's qualifications, ears, and brain cells.

The 24K gold XLO/Reference Recordings Test & Burn-In CD ($29.98; www.referencerecordings.com) is one of several discs available for optimizing audio system performance.

So, after first making a pledge to be civil, let's look at the theories behind audio break-in and the components it applies to and sort out some of the haggling.

Listen Carefully

For those who swear by the break-in process, most pieces of an audio system are affected to one degree or another: the speakers, the main components such as the power amplifiers and CD players, and, yes, even the speaker cables. However, because each component is different from the others in function and design, the rationale for break-in and the process itself can be quite different.

Speakers. To some people's ears, new speakers can sound somewhat lifeless straight out of the box. The low end may be weak; the higher frequencies may sound thin and strident. This is generally attributed to physical stiffness in the various speaker components—their mountings and even the materials from which the driver cones and horns are made. Woofers are particularly susceptible; if you've ever popped the grill off a speaker cabinet while it's handling deep thumping bass at high volume, you've probably observed the woofer pumping back and forth.

After time and careful use, though, tight components will loosen up and settle into their full mechanical specifications, becoming more pliable and thus performing with greater sensitivity. The sonic depth fills in, the harshness smooths out, and the overall sound becomes richer and more cohesive.

How long is this supposed to take? Ultimately, it depends on the manufacturer, but 30 to 50 hours is an often cited rule of thumb; in some cases, manufacturers may recommend as long as 100 or more hours.

The recommended break-in methods can be even more varied. For some proponents, it happens normally in the course of everyday use. Some recommend giving speakers an initial workout at low to moderate volume, with music heavy on **transients** (quick spikes in volume). Other methods are stricter, prescribing a beginning period in which the speakers play nothing but broadband noise frequencies, such as pink noise (for example, tuning in an empty FM radio band and letting this play continuously for a few days). Finally, for those who really treat the process as a science, there are special break-in CDs containing tracks of noise transients, with instruction to play them a certain number of hours.

Amplifiers and other components. So you think the amplifier/receiver and other pieces of gear in your rack are performing at 100% when they're so new they still smell like packing material? Some manufacturers beg to differ, claiming that before gear will work at its best, it needs a burn-in period during which the circuit board's capacitors gradually become charged and the unit's electron flow is established.

Odyssey Audio (www.odysseyaudio.com), makers of high-end amplifiers and speakers, identifies no fewer than four stages of performance variation that occur over hundreds of hours of use.

In the first stage, when the cold unit is initially turned on, for the first several minutes, its sound can seem harsh and its dynamics constricted.

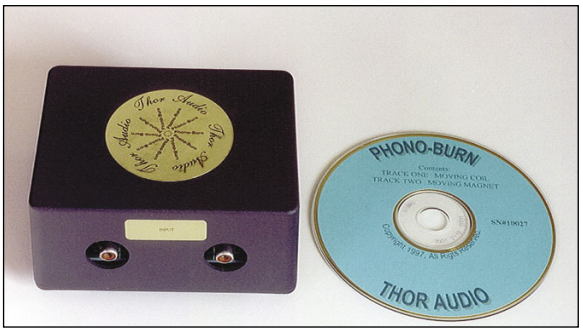
The second stage comes within the first hour or two of play as the unit loosens up and improves its handling of dynamics, transients, and clarity.

In the third stage, after eight to 10 days, the tonal balance grows more refined, with silkier higher frequencies and greater bass articulation.

Alas, you have to wait at least six weeks for the fourth stage when the unit blossoms into its full magnificence. And you'd better not have turned off the power during that time, either, or else the capacitor charge will dissipate.

Cables. According to hardcore audiophiles, even speaker cables need breaking in for a couple of reasons. First, subtle changes develop in the conductive properties of the cable wiring. Second, the electrical current carried in the wiring will interact with the sheath of insulation material (technically known as a dielectric); in time, so the theory goes, the dielectric becomes charged, which cuts down on signal loss and distortion, thus improving the sound.

Although this is a natural process, with manufacturers claiming time frames of anywhere from mere days to hundreds of hours, there are devices that will accelerate the process by "cooking" the cables with intense frequency oscillations. The results: improved clarity, definition, and sonic imaging, which some liken to a night-and-day difference.



For turntable enthusiasts, Thor Audio's Phono Burn ($350; www.thoraudio.com) routes the signal from its included burn-in CD through the phonograph's input channels.

Enter The Skeptics

As you might imagine, the more esoteric the rationale (and expensive the process) for breaking in audio components, the more controversial it is. For many who also proudly wear the label audiophile, the notion of break-in implies that components are evolving organisms and subject to unpredictable outcomes . . . something that completely contradicts the quality-control standards sought in mass-production environments. For others, if science can't definitively pin down the alleged changes, they're not worth going out of your way to pursue.

If that's the case, what's really going on? According to naysayers, any of the following may cause belief in break-in and are not necessarily mutually exclusive.

The vestigial function theory. Decades ago, audio components incorporated vacuum tubes in their signal flow. Tubes not only needed a few minutes of warm-up each time a unit was switched on; they could also grow more seasoned with continued use.

You can still find tube-based niche items out there, but in today's solid-state world, you're more likely to find tubes used for music production rather than media playback. Guitarists especially cherish tube amplifiers because a tube's natural propensity for generating subtle harmonic distortion creates a warm, lively tone.

Therefore, skeptics claim, what was normal behavior from tube components became a phantom belief applied to solid-state electronics, as well.

The conspiracy theory. To this theory's adherents, who often cite as evidence the increasingly long time frames that manufacturers recommend, break-in is merely a marketing tactic to discourage returns.

A typical scenario plays out like this: After you get a pair of speakers home, you quickly decide that, in your listening environment, the new set doesn't sound as good as the in-store demonstrator models that you based your decision on. Ordinarily, you might take them back to the store, but you're less likely to do so if you hold off making the final judgment call until after a recommended period of 30 or 50 or 100 hours of listening. By that time, you're much more likely to have grown accustomed to the speakers' sound and decided you like them and will stick with them.

In other words, you aren't breaking in a component, but rather your ears and perceptions.

The placebo theory. It's basic human nature. People hear what they expect to hear. And there may be some ego salving going on, too. Most anyone who has just invested 75 scrupulous hours going through a burn-in process and perhaps shelled out extra for a device alleged to do the job with factory precision will be loath to admit that it's made no discernable difference.

One manufacturer's perspective. Although Ben Milne of Elemental Designs Audio (www.edesignaudio.com) can't speak for all manufacturers, he certainly puts things in a revealing perspective. For Elemental, break-in recommendations are actually a tactic for protecting customers (and thus the company) from their own worst impulses.

"That [break-in recommendation] sheet is there flat out to scare people," Milne says. "Why scare people?"

Milne cites the customer service woes of dealing with buyers who grossly abuse new speakers straight out of the box and then blame the speakers, both in public and in calls to the company.

"It becomes obvious. Some people aren't respecting their equipment," he says. "Believe it or not, that little piece of paper makes people think '[It's] just a speaker, [it's] fragile if misused.' People think more. They spend more time doing the things they should—paying attention to gains, [frequency] crossovers, box sealing, etc.—than just screwing it in and seeing how loud it immediately gets."

Moreover, Milne indicates, tender loving care can help prevent small problems from becoming big problems. If speakers, treated respectfully, don't sound quite right at first, the buyer tends to troubleshoot. If the buyer simply connects the speakers and right away cranks them to the max and they sound wrong, he might have already damaged them.

"Whether or not breaking in is really necessary, we can only speculate. I don't break in speakers, really, for any exacting amount of time, but I have undoubtedly heard speakers sound different over a period of time. We don't include that sheet because we truly believe a break-in period is 100% necessary. We include it so people respect their equipment and take more time installing it. And it's done wonders for us."

Just Press Play

The final word on break-in is that there is no final word. Anecdotal evidence may not be hard science, but it's fair to say that for some people, and for some components, a noticeable change that occurs during a break-in period is a valid phenomenon. Laboratory tests measuring performance have indeed shown that some components undergo subtle changes over time. Whether or not they're audible is another matter, but undoubtedly some people have ears that are more sensitive to such subtleties. And it could well be that break-in better applies to higher-end components, manufactured to such exacting specifications that they're more likely to relay performance subtleties.

Then again, we can't ignore human nature. Audio quality, especially when judging fine distinctions as better or worse, is highly subjective. And replacing one component with another (swapping out A in favor of B) can be sonically jarring. If there's an audible difference between them, however slight, it can contrast with the listener's accepted definition of normal. Gradually, though, one's ears acclimate, and B becomes the new normal.

We find no reason to discourage anyone from putting new components through a break-in period. Part of it is just common sense: Treat the equipment with care, double-check your connections, and show patience before seeing how big a seismic event you can trigger with the volume knob. Also, it's not a bad idea to leave your system turned on permanently. It isn't the constant presence of electricity that puts wear and tear on circuitry, but rather the initial surge of juice when a cold component switches from off to on.

And if you want to go beyond that, such as playing a few dozen hours of pink noise before moving on to the real stuff or investing in a CD calibrated with break-in frequencies, that's your prerogative.

While researching this piece, we found brain-numbing calculations from engineers purporting to debunk burn-in processes. We wouldn't dare argue with them. Yet we can't help but recall that science also once used equations to prove why a human being would never run a 4-minute mile and to show why bumblebees shouldn't be able to fly.

The final arbiter on break-in must be your own two ears. Trust them and don't let anyone else tell you what you hear or don't. CE

BY BRIAN HODGE

At $1200, the CBID1 Cable Burn-In unit from Nordost (www.nordost.com), makers of premium audio cables, isn't likely to end up in too many homes. But its services are one of the perks that some high-end dealers offer good customers; other outlets rent them. (This unit is undergoing a redesign that should be completed in September 2004.)

Sights & Sounds

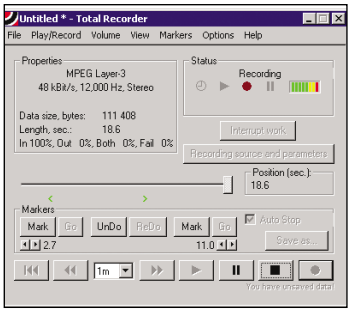
Digital Rights Reclamation

Commentary by Brian Hodge

Digital music's advantages are legion. But in the age of the digital music store, there's one big drawback: There are certain restrictions on the way you can use your purchase when compared to traditional physical formats.

In our January issue (Vol. 2, Iss. 1), fellow columnist Sascha Segan ("You Don't Own This Song," page 12) took a look at this phenomenon, making many good points. Although I don't completely agree with his assessment that you don't actually own the music you've bought, there are definite limitations on use that have no precedent in older music formats. You've still, however, engaged in a sales transaction; it's just that there's no tangible medium of delivery.

At issue then: What are we really buying here? Are we merely buying a restricted-use 4MB file, or are we buying our very own copy of the sonic experience? My feeling is that we're buying the latter; we just have to take an extra step or two to assert full ownership.



Total Recorder and WireTap are two of several simple programs that will help you record what's yours.

When Rights Collide

If you believe that artists have every right to be compensated for their work, it's tough to argue that record labels have no right to safeguard against the rampant piracy that digital files are so vulnerable to. It doesn't matter if you believe the recording industry's dogmatic single-bullet theory that unauthorized downloads are responsible for its precipitous sales drop-offs—the industry believes it. (Further fueling that debate, two mathematicians from Harvard Business School and the University of North Carolina have just published a study concluding that sales losses attributable to file-sharing are "statistically indistinguishable from zero.") To meet the challenges of piracy, copy protection has become an inescapable fact of life.

The problem is, copy protection schemes encroach upon one of the rights long guaranteed to consumers: the Fair Use doctrine, which among other things permits a buyer of copyrighted material to make copies of the work for backup or other personal use. In essence, copy protection schemes seek to thwart the intentions of criminals by presuming that everyone is a potential criminal . . . and in the process violating basic consumer rights.

Idealists might excuse this by claiming that technology has advanced more rapidly than lawmakers have been able to evaluate it and address its ramifications. Pragmatists (or cynics) might regard the situation as one more instance of an industry trampling consumer rights because nobody's squawking about it very loudly and regulatory agencies don't much care.

In the area of digital music, Apple's iTunes Music Store has struck the best compromise between copy protection and personal liberty: You can authorize five computers to play the songs you've bought, easily transfer authorizations from one computer to another, load the songs to an unlimited number of iPods, and burn a song to an unlimited number of CDs (although you can't burn the same playlist to more than seven CDs). I don't find that unduly restrictive. It's light years beyond early subscription services that let you download music you had to continue paying to listen to, which was less copy protection and more of an old-fashioned protection racket: "Nice music collection you have there, chum. Be a shame if something happened to it."

Still, as livable as the terms of iTunes and its imitators might be, it's easy to conceive of situations that chafe against them. Suppose you want to add a sixth home computer to your playing stations? Or use a song in a portable player that doesn't support iTunes' AAC encoding? Remember, these are within your Fair Use rights.

An oft-cited workaround is to burn a CD and rip a copy from that, but it's not a very elegant solution. It takes extra time, eats discs, and assumes you have a CD-burner. Many people don't.

A more direct solution is to re-record the audio signal. Many programs enable this by capturing the audio stream between a player and the computer's soundcard.

For PCs, one well-regarded program is Total Recorder ($11.95; www.highcriteria.com). You'll find dozens more, including freeware, under the Audio Recording category at Shareware Music Machine (www.hitsquad.com/smm). For Macs, try Audio Hijack ($16; www.rogueamoeba.com) or the free but more limited WireTap (www.ambrosiasw.com). Most programs let you save recordings in your choice of formats. Others save to uncompressed formats only, so you'll then have to convert your new recordings to gain the space savings of MP3s, etc. Some include additional features such as timers for recording Webcasts.

Remember, though: With rights come responsibilities. Use these programs for anything other than personal use, and you become part of the problem that resulted in copy protection in the first place. CE

BY BRIAN HODGE

Introducing the AMD Athlon™ 64 FX processor. Take your system to extremes.
Double the data path from 32- to 64-bit and you more than double the thrill factor. Uninterrupted, ear-splitting, streaming audio and rich, razor sharp video make your pad a launching pad. What's more, you get all the power you need to edit, mix, and model your own digital creations with memory to spare. Prepare to blow minds. Get a dose of the AMD Athlon 64 FX edge at www.amd.com/amdathlon64fx

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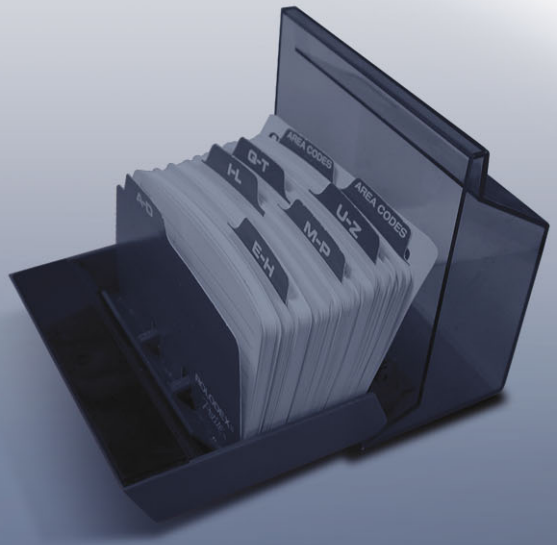
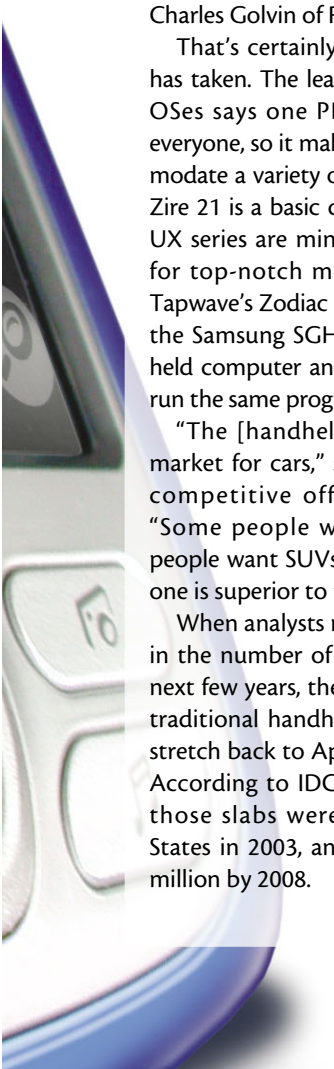


POWERFUL Digital Appliances

PDAs Aren't Just Rolodexes Any More—But What Are They?



It's all personal.

PDAs are in a moment of transformation. For years, we used them mostly as digital Rolodexes—something analyst Dave Slaughter of IDC calls "the killer application of the 1990s." But as the little handheld computers slide into the 21st century, their makers are reinventing them in forms that reflect a wide range of 21st century lifestyles.

"[For PDAs] there is no killer app; there is only your killer app," says analyst Charles Golvin of Forrester Research.

That's certainly the tack PalmSource has taken. The leading producer of PDA OSes says one PDA can't possibly fit everyone, so it makes software to accommodate a variety of needs. The PalmOne Zire 21 is a basic calendar keeper. Sony's UX series are mini-notebooks designed for top-notch mobile Web browsing. Tapwave's Zodiac focuses on games. And the Samsung SGH-i505 merges a handheld computer and a flip phone. All can run the same programs; all are PDAs.

"The [handheld] market is like the market for cars," says PalmSource chief competitive officer Michael Mace. "Some people want minivans; some people want SUVs. It doesn't mean that one is superior to the other."

When analysts mention the slow slide in the number of "PDAs" sold over the next few years, they're talking about the traditional handheld slabs whose roots stretch back to Apple's Newton in 1993. According to IDC, about 5.1 million of those slabs were sold in the United States in 2003, and sales will dip to 4.5 million by 2008.

PDA phones, on the other hand, are booming. IDC says nearly two smartphones will be sold for every standalone PDA this year. And nobody's quite sure how to track oddball outliers, such as the Tapwave Zodiac or Nokia's N-Gage QD, a combination PDA/mobile phone/handheld gaming device.

Smartphones are getting more popular, but their high prices mean classic PDAs aren't going to die any time soon, says analyst Todd Kort from Gartner Research. Most smartphones cost $400 and up. At the lower end of the price scale, it'll take awhile for phone manufacturers to merge PDA functionality into their products, says Kort.

Personal Patterns, Personal Devices

PDA innovation isn't only about phones. Many PDAs now include low-res digital cameras—the kind you'd use for visual notes, if not for definitive memories. With high-resolution color screens now appearing even on sub-$200 models, most PDAs function as photo albums, replacing the crumpled photos in your wallet. Quite a few have built-in MP3 players, and the ability to play video is spreading.

Taking a hint from their successful smartphone cousins, standalone PDAs are also more connected than ever. Of the standalone PDAs sold in the last quarter of 2003, 17% were able to connect to Wi-Fi or cellular networks, Kort says, and that number is growing fast. Modern PDA browsers display full Web pages and handle all kinds of email attachments.

Beyond the flashy multimedia features, PalmSource's Mace says, two-thirds of PDA owners customize their handhelds with additional programs. Doctors load up anesthetic dose management software. Knitters load their devices with patterns; cat fanciers load pet care software. Scoutmasters load Boy Scout troop management software. Schools use PDAs to replace graphing calculators, and teachers load them up with grading software.

Connectivity and flexibility were what drew Suma CM, a corporate vice president in New York City, to her new Sony TG-55 PDA. Running from meeting to meeting in Manhattan, she can check her email at wireless hotspots, read attachments on the included Picsel Viewer software, and find restaurants with Vindigo's city-guide software.

Kent Willyard, a doctor in Newport News, Va., packs his PDA with drug reference and diagnosis software. And Cathryn Stephens, a reporter for KVAL TV in Eugene, Ore., types scripts onto her keyboard-equipped Dell Axim X5 PDA so she doesn't have to unpack a bulky notebook or retype handwritten scripts when she gets back to her desk.

"It's turned out to be really amazing; I've actually used it in the field without docking back at the main station and read my script right off the handheld," Stephens says.

The Personal Digital Assistant is dead. Long live the Powerful Digital Appliance—whichever one, in its many forms, is right for you. CE

BY SASCHA SEGAN

The Great Debate

Picking A Handheld OS

They're like apples and oranges—both fruity, but with distinctly different flavors.

Deciding whether to go with Palm OS or PocketPC/Windows Mobile is the first choice you must make when you pick a handheld or smartphone.

Like Mac OS and Microsoft Windows on the desktop, PalmSource's Palm OS and Microsoft's PocketPC are excellent OSes that can do everything most consumers need. But they have different strengths when it comes to software and compatibility.

Palm OS is the dominant OS for consumer PDAs. At press time, Palm outsells PocketPC by a 60:40 ratio, according to comparison-shopping site PriceGrabber (www.pricegrabber.com). Palm's hallmarks are speed, simplicity, and a range of third-party programs.

The first popular PDA, the Pilot 1000 in 1996, ran the first version of the Palm OS. Nowadays, you have three versions to choose from. Palm OS 4 devices, such as PalmOne's Zire 21, are inexpensive but lack multimedia features and are weak on Web browsing. Palm OS 5, also known as Garnet, supports faster processors. You'll find more memory and higher-resolution screens, and you'll be able to play MP3s on OS 5 devices.

The news in the Palm world, though, is Cobalt, otherwise known as Palm OS 6. Devices running Cobalt should start appearing around the time this magazine hits the streets. Cobalt is the first Palm OS to support true multitasking: You can play a game while the handheld downloads your email, for example. Cobalt also has advanced multimedia features such as high-quality video playback.

PalmSource, the makers of the Palm OS, encourages variety in Palm OS-based devices. You'll find Palm OS-based gaming machines, smartphones, mininotebooks, and multimedia handhelds. But they all run the same programs; PalmSource estimates that 80% of Palm OS 4 programs run on Palm OS 5 devices, for instance.

Mobile Windows

Microsoft's handheld initiative started in 1996 as Windows CE. Now Windows Mobile, it looks and acts a lot like Windows, although it doesn't run Windows programs designed for desktop PCs. Windows Mobile offers excellent multimedia features, such as playing back a variety of audio and video formats.

Windows Mobile devices also typically have large screens, and corporate IT departments love them because they connect easily to Microsoft Exchange servers.

There are a slew of versions. PocketPC 2002 has largely been replaced by Windows Mobile 2003 For PocketPC, which everyone calls PocketPC 2003. PocketPC 2003 can connect to most wireless networks instantly, without confusing configuration screens. The Contacts application jumps to the right name when you enter the first few letters. And you can now edit photos or play Windows Media Player 9 music and videos on your PocketPC. For playing multimedia content or connecting to the 'Net, go for the newer version.

Sony adds software to its Palm OS handhelds to turn them into portable photo albums.

Windows Mobile Smartphones have either Pocket PC Phone Edition 2003 or Windows Mobile For Smartphones. Pocket PC Phone Edition 2003 is basically the same as PocketPC 2003; some extensions let you make phone calls. You'll find Pocket PC Phone Edition 2003 on slab-style smartphones such as the Samsung i700 and Hitachi G1000.

Windows Mobile For Smartphones, though, is another beast entirely. It's built to run on small, pocket-sized phones without keyboards or touchscreens.

Windows Mobile For Smartphones runs few third-party programs; most people use Windows Mobile For Smartphones devices (such as the Motorola MPX100) to check email, contact info, and calendars, as they sync up very easily with Microsoft Outlook and Exchange servers.

How do Palm OS and Windows Mobile compare? Let's take a look.

Price

Palm OS devices are cheaper than PocketPC devices. According to comparison-shopping site PriceGrabber, the average Palm OS handheld costs $289, and the average PocketPC 2003 machine costs $424. Because Palm OS uses less memory and processor power than PocketPC, you can get a basic Palm handheld for $99 (PalmOne's Zire 21); PocketPC doesn't have anything to compete.

In mid-range devices ($200 to $500), Pocket-PCs are more competitive. Dell's Axim X3 has a 300MHz processor and 32MB of memory for $199, and Dell's Axim X3i adds more memory and Wi-Fi networking for $349. That's competitive with Sony's PEG-TJ37, which runs Palm OS 5, offering Wi-Fi and less memory but a bigger screen for $299.

There are more high-end PocketPCs than Palms. Top-end PocketPCs, such as the HP iPAQ h5555 ($649), generally look and act the same as cheaper PocketPCs; however, they have fast processors and massive amounts of memory, helping them better handle music, video and large documents, and databases. At the top end of the Palm lines, you'll find innovative concepts, such as Sony's mininotebook, the PEG-UX50 ($599.99) or PalmOne's T3 with its rotating screen ($399). On the whole, we'll say Palms offer more value for the money.

Software

There's more Palm OS software than PocketPC, but PocketPC applications seem comfortingly familiar to Windows XP users. Gartner Dataquest analyst Todd Kort estimates that there are 20,000 applications for Palm OS devices, and only about 6,000 for Pocket PC machines.

The most popular applications (office apps, communications apps, personal information management, and many games) are available for both systems.

PalmSource's Expert Guides Web page (www.palmsource.com/expertguides) picks out the best software for various professions and hobbies. There's an aquarium-maintenance tracking application for fish fans, a medication database for doctors, and a super-metronome for musicians. It's safe to say that no matter how weird your hobby or how unique your profession, there's probably some Palm OS software out there for you.

The strength of PocketPC's software comes in "extending the familiar experience people know on their desktops," a Microsoft spokeswoman told us. That means the familiar feel of, and tight integration with, applications such as Outlook, Internet Explorer, and Windows Media Player. If you love Windows and don't want to have to learn new applications, that might win you over to PocketPC.

Windows Mobile For Smartphones is a stripped-down OS that runs on phones, such as the Motorola Mpx100.

Multimedia

This is a big winner for PocketPC. Palm OS devices can play MP3s, but videos have to be re-encoded into a strange format called Kinoma to play on Palm OS 5 devices.

Pocket PCs play MP3s and WMAs (Windows Media Audio), including songs you buy from online stores such as Napster and Musicmatch, and they also play Video For Windows files. If you use Windows Movie Maker or Microsoft Plus! Photo Stories on your home PC, you can easily export your own homemade videos to your PocketPC.

This may change by the time you read this, as PalmSource says the new Cobalt OS will have better multimedia features, and third-party developer NormSoft (www.pocket-tunes.com) is working on a WMA player for Palm OS machines. But right now, PocketPC rules.

Internet Access

You can find Palm OS and PocketPC devices with Bluetooth, Wi-Fi, and cellular networking. All Pocket PC 2003 devices have zero-configuration networking, meaning they sense wireless networks and can jump on them effortlessly. And all PocketPC 2003 devices run Pocket Internet Explorer and Pocket Outlook, which look and work (mostly) like the IE and Outlook on your desktop PC.

Different Palm OS devices have slightly different networking software. There are multiple browsers, multiple email programs, and multiple ways of connecting to networks. So while you may be able to find Palm applications that fit your needs better than PocketPC's (such as the excellent NetFront Web browser or Picsel attachment viewer), you'll have to do more research to figure out which ones are right for you.

We'll give this one to PocketPC.

Ease Of Use

The Palm OS interface focuses on speed and simplicity. It's usually possible to get where you're going in fewer taps and clicks using a Palm device than a PocketPC. The PocketPC interface, on the other hand, looks like Windows. It's in familiar Windows colors. There's a Start menu, and the Web browser looks and acts like IE.

Palm OS devices typically require you to write on the screen in a stylized script, called Graffiti 2. PocketPCs, on the other hand, read ordinary block handwriting. You can also get keyboards for both kinds of devices.

PocketPC's Windows-like interface soothes new users. But once you learn

The Rundown

	Palm OS 5	PocketPC 2003	Winner
Price	$99 and up	$199 and up	Palm OS
Ease Of Use	Famously simple	Looks like Windows	Even
Software	20,000 programs	6,000 programs	Palm OS
Multimedia	MP3s, games, limited video (better on Cobalt)	MP3s, WMAs, games, Windows standard video	PocketPC
Internet Access	Great browser and viewer on some models	Pocket Internet Explorer, zero-configuration networking	PocketPC
Home Compatibility	Add-on program provides awesome Office compatibility	Connections built into Windows, but Pocket Office isn't great	Even
Business Compatibility	You must install software	Microsoft eases the way	PocketPC
For Phones	Chunky, but compatible	Still hasn't lived up to its promise	Palm OS
Market Share	The current leader	Coming up fast	Even
Conclusion	Better for consumers	A growing business standard	Even

the Palm interface, you find that it's much speedier and easier to use for most applications. This one is a tie.

Home Compatibility

This one's a wash. Microsoft's ActiveSync puts your PocketPC onto your desktop PC: Moving and installing files is integrated into Windows Explorer. Without much effort, you can get your PocketPC to sync with other Microsoft products, too, especially Outlook.

But if you're willing to install a program or two, Palm OS devices are just as compatible. An Outlook link comes with all Palm devices. And the third-party program Documents To Go, included with all Sony CLIE handhelds, reads and edits Microsoft Word documents better than Pocket Word and Excel, which tend to lose formatting.

Business Compatibility

This is PocketPC's big strength. If your business is standardized on Microsoft back-end servers, your IT department may ask you to buy a PocketPC. "There's a more concerted focus on the PocketPC side toward the enterprise," says Forrester Research analyst Charles Golvin. "The devices tell the story about synchronization with enterprise applications better."

Palm OS devices do sync with office machines. If you're allowed to load software on your office machine or if your IT department supports Palm OS, you can run your Palm pretty easily. But network security typically depends on individual users not loading third-party software onto their networked systems, and IT departments generally prefer Microsoft products. For that reason, Pocket PC gets the point here.

Phones

Palm OS-based smartphones, such as the Samsung SGH-i505 and Handspring Treo 600, run thousands of Palm software applications and actually feel like phones. They won't win any prizes for being lightweight or thin, however.

Pocket PC Phone Edition devices are slabs with a phone. Even the slenderest, the Hitachi G1000, looks like a pocket calculator. Microsoft Windows Mobile For Smartphones phones, meanwhile, are phones with a few handheld-computer features. Overall, Palm OS has delivered a balance between handheld PC power and phone form, and Palm OS devices have a better integration between phone and handheld applications. PocketPC phones are chunky or (in the case of Windows Mobile For Smartphones) underpowered.

At press time, Verizon offered Palm OS phones, Pocket PC Phone Edition 2003 handhelds, and Windows Smartphones. Sprint and T-Mobile offered Palm OS phones and Pocket PC Phone Edition 2003 devices. AT&T Wireless offered Palm phones and Windows Smartphones, and Cingular offered only a Palm OS phone. We'll give this category to Palm.

Market Share

"Some people think PDA, they think Palm Pilot," says analyst Dave Slaughter of IDC. PalmSource has dominated the handheld market for years, with Microsoft products playing a continual game of catch-up.

Both OSes are here to stay, all the analysts we spoke to said. IDC's Slaughter projects that by 2008, PocketPC will have a slight edge over Palm, but that might be because Palm is dominant in the consumer PDA realm (which isn't growing) whereas Microsoft is focusing on businesses (which are buying more PDAs). It looks like PalmOS and PocketPC will be neck and neck for the foreseeable future.

The Final Call

For basic calendaring and contact management, any PDA will do well. Palm OS machines are generally cheaper and simpler to use, and they have a wide range of software to fit every personal need. PalmSource focuses on the needs of consumers, which really shows in its products. But especially if you sync with a Microsoft Exchange server, PocketPCs may provide a smoother experience at the office.

BY SASCHA SEGAN

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Discover Your PDA

Although Not Endless, PDAs' Functional Possibilities Have Expanded

Some people swear by PDAs. Some swear at them. But there's no denying the popularity of handheld computers.

Over the last decade, PDAs have come into their own. They function wherever you are—on the road, in the restaurant, on a trip overseas—giving the PDA a unique place among computers.

And now, you bought your first PDA. Congratulations. You'll find getting up to speed on your PDA is a relatively trauma-free process. The learning curve is lower than for PCs, with a friendly environment that's more menu-driven. However, there's nothing wrong with a little outside help, which is what we're offering here. In this feature we'll pass along some of the PDA tips we've accumulated over time, including information about such topics as maintenance, basic navigation, and memory cards. There's far too much to cover in a single article, so be sure to read the next two articles in this section for specific information on devices that run Pocket PC (page 65) and the Palm OS (page 68).

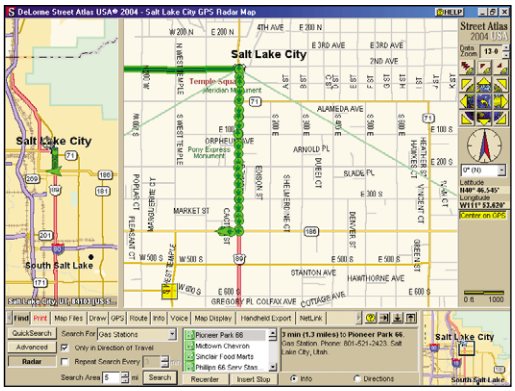
Start Syncing

You'll discover when you unwrap your new PDA that it's two pieces of hardware: the palmtop and its docking cradle. The latter plugs into your palmtop and the USB port on your PC, and it's important to your palmtop and its continued health. It's the power conduit to your PDA's battery, the portal through which you load new software from your PC, the means for transferring data back and forth between PCs and your palmtop, and the way you ordinarily back up your entire PDA's contents. The software programs that synchronize these operations are HotSync, for a Palm-style PDA, and ActiveSync, for a Pocket PC. Whichever you use, it's arguably the most important software on your palmtop.

How often should you sync your PDA with a PC? If you add or make important changes to files on your PDA, we suggest that you synchronize soon thereafter. That way, assuming the worst occurs, a perfect copy of your PDA's directories, applications, and data files are intact on another computer. (Speaking of which, keep in mind that if you delete a file from your PDA and synchronize afterward, its duplicate will be deleted from the PC. So if you want to retain a copy of that file off your PDA, move it out of your PC's PDA backup directory.)

ClearTouch protects your PDA's screen from scratches and repels dust.

Docking stations have limitations: They have bulky power supplies, require AC power, and generally feature lengthy cords. But if you want to sync without the hassles—maybe after you've re-edited a document on a plane trip with your PDA and notebook—there's a way around it all. Try IR (infrared) syncing, which uses an infrared beam (invisible to human eyes) to send and receive data between two computers. PDAs have IR ports, but you'll have to make sure the other computer you want to sync with has one, too. You may have to upgrade the software and drivers on either or both units and reset the HotSync/ActiveSync mode in your PDA,



Earthmate GPS guides you to your destination.

Attach the eyemodule2 digital camera to your PDA, and you can quickly view the pictures you've taken.

as well. (Check your PDA and PC's documentation for specific details.)

All of this setup can be a hassle, but once you've set things up, you probably won't have to do it again, at least not for your current devices. IR syncing makes it easy to share data simultaneously across devices and removes the annoyance of juggling and tracking physical connections every time you need to sync.

Navigation, PDA-Style

Most PDAs use a stylus rather than a keyboard for navigation. The look and feel of a Pocket PC is familiar because it resembles the Windows OS that runs on your PC. But you can't run Windows applications for your Pocket PC on your PC or vice versa. They appear similar and use some of the same source code, but they're not identical. Some will be able to share data files, though, such as Word and Excel. Check your program documentation for the details. Be sure to check out the Start menu and the Shortcut bar for all your applications and preferences, just as you would in any modern Windows OS.

In contrast, the Palm OS interface is more like the menu-driven Mac. Once you've memorized a handful of icon symbols, you can navigate pretty much anywhere. The house-shaped icon takes you Home to your root directory, for example. All of your programs should be displayed there. If you're nested several directories deep and want to back out without climbing a series of menus, clicking Home automatically takes you there.

Most Palm PDAs also have four hardware buttons located below the screen that are preset to run certain programs, such as Notepad or Contacts. You can change the buttons, but the exact way of doing so differs from unit to unit. In any case, you will want to get to your PDA's Preferences menu. Once there, click Buttons or maybe Preferences and then Buttons. You'll see images of those hardware buttons alongside drop-down menus of all your programs. Just choose a different program to reset any button.

It looks sturdy, and it is sturdy. But a PDA made out of anything other than

Fellowes' PDA Screen Clean supplies wet and dry tools to do the job.

diamond would end up looking battered after a few days rolling around in anybody's briefcase or purse, coming into contact with pens, paperclips, cosmetics, notepads, cell phones, etc. Looks aren't everything, but scratches on your PDA can impair your device's effectiveness. Screen scratches can make a mess when you're taking or editing notes with a Pocket PC. Scratches in the Graffiti area of a Palm device can lead to poor handwriting recognition.

We recommend that you buy a good case for your new PDA. The soft slipcover that comes with many models isn't very useful. For example, if you can ball a case up in your hand, it won't really offer heavy-duty protection. You're better off getting a hard case that puts a firm barrier around your PDA. You'll find plenty of models, including several that feature belt clips, inner pockets (for memory chips), and Velcro or magnetic closure pads.

Dealing with the inside of your briefcase isn't the only threat to your PDA, however. Once it's out in the open, minute air particles (from smoking, precipitation, paint, car exhaust, or just ordinary dust) will gradually collect on your palmtop's viewing area and render it that much harder to read. There are cleaning kits available, such as Fellowes' PDA Screen Clean ($24.99; www.fellowes.com), which supplies both cloths and a wetting solution to keep your palmtop's display in pristine condition. However, common-sense and everyday supplies will do just as well in a pinch: a tissue, moistened in a bit of purified water (such as the kind you can buy at many restaurants and supermarkets), or a lens-cleaning cloth for eyeglasses can do just as well.

You can also reduce the wear and tear to your PDA screen over time by following a few simple rules. First, try not to touch the screen because that puts oil from your fingertips on the surface. (These oils combine with airborne dust and dirt to form a solid, if thin, layer of sludge.) Second, if a speck of dirt gets stuck on the display and you can't gently wipe it off with a soft cloth, avoid using brute force or prying underneath it. A few drops of water left on the object should loosen its hold so you can remove it a few minutes later.

Finally, assuming you believe an ounce of prevention is worth more than any cure, consider buying a screen protector. One of the best we've seen is BoxWave's Clear-Touch ($12.95; www.boxwave.com/products/cleartouch). It's easy to

apply and remove, cuts glare, repels dust, and protects your PDA screen. It's washable, too.

Add RAM To Your PDA

How much memory does your PDA need? That depends in part on the PDA you own. A Palm Tungsten T2 has 32MB of standard RAM, while a T3 has 64MB of RAM, and the Toshiba e805 Pocket PC has 128MB of RAM. (Not all of which is available for your use; some of it powers the OS. For example, of the 64MB of RAM available in the Tungsten T3, only 51.6MB is at your disposal.) Typically, older units have less memory capability. Because your PDA stores everything in memory instead of on a hard drive, data that takes up a lot of space, such as movies, music, and ebooks, consumes a lot of memory.

The Lexar Secure Digital Card can add 256MB of RAM to your PDA.

Because you can't easily upgrade the RAM inside your PDA, consider the next best thing: Add memory through a memory card (sometimes called flash storage). You can then off-load those memory hogging data files onto the card. The RAM needed to access the files will come from the card, not from your PDA. It's a good reason to have extra memory available.

If that isn't reason enough, here's another: Using memory cards lets you copy files without syncing. Simply copy the file to your PDA's memory card and slide the card into another computer's expansion slot. And if that doesn't make the decision for you, here's a third reason for a memory card: Insurance. You can use a memory card to make quick backups. We heartily endorse this because you never know when disaster will strike hardware. Having an up-to-date copy of your important data in a location separate from your PDA is always a good idea.

The bad news is that there's no single industry standard for an expansion slot on the Palm or Pocket PC, but there are two or three broadly defined standards for each. (For most PDAs, the expansion slot is on the top, while the syncing slot is on the bottom.) The good news is that most PDA add-ons will fit a variety of recent models or fit with an adaptor. There are so many different memory cards for each standard that you should have no problem acquiring an appropriate card for anything from 16MB to 512MB of RAM. Check with a vendor you trust who is familiar with your specific PDA and all the expansion formats to get accurate information about what works to your advantage.

The full-sized Stowaway Keyboard attaches to your PDA.

The Veo Photo Traveler is a digital camera for your PDA's expansion slot. It features a swivel lens and adjustable focus.

Other Expansion Devices

Just because you need a handheld PC that's easy to manage doesn't mean you're necessarily bound by the physical limitations of your PDA. Nearly all PDAs that are sold today include some kind of slot or port that can act as an interface for other devices; sometimes they have more than one. This adds a whole new world of functionality to your PDA.

Want to run a camera from your palmtop? Some PDAs, such as the Palm Zire 71, already include digital camera technology, but most don't. Fortunately, there are several digital cameras designed to integrate with your palmtop, such as the eyemodule ($49.95; www.eyemodule.com/splash.asp) and eyemodule2 ($149) and the Veo Photo Traveler line (starting at $79.95; www.veo.com/products_pda.asp). The former offers thumbnail viewing, while the latter supplies a swivel lens with adjustable focus.

Tired of scrawling notes or using a built-in keyboard sized for hobbits? Add a full-sized keyboard that folds neatly into a package no bigger than your PDA. Consider the Stowaway Portable Keyboard ($69.99; www.thinkoutside.com). There are both Palm and Pocket PC models, as well as versions that plug into your PDA's HotSync port (you'll have to buy a separate adapter with some Pocket PC models) or use an IR connection.

GPS, the Global Positioning System, lets a person pinpoint her location via signals sent and received in real-time from orbiting satellites, and that, too, is available as a PDA expansion for both Palms and Pocket PCs. These software/hardware combos, such as the Earthmate GPS Receiver from DeLorme (starting at $209.95; www.delorme.com/earthmate), the Mapopolis GPS (starting at $199; www.mapopolis.com), and the Deluo GPS/Rand McNally StreetFinder bundle ($149.90; www.randmcnally.com), come with extensive maps that consume quite a bit of memory. Some even let you input goals and offer voice directions.

There's a lot more to PDAs than just syncing, maintenance, and expansion devices. But maybe we've encouraged you to think of your handheld as more than just a convenient address book or calendar. It's a powerful computer-in-miniature. And if you treat it right and study its possibilities, your PDA can be a useful tool in many aspects of your life. CE

BY BARRY BRENESAL

Pocket PC Nuts & Bolts

Working With Advanced Menus

Anyone who's worked with Windows can figure out how to navigate a modern Pocket PC's interface relatively quickly, but there are plenty of advanced features lurking within the basic menus.

Maybe you don't know where to look, or maybe you don't know what a certain command does, but the following tips and instructions can help you get the most out of your Pocket PC.

Several Pocket PC OSes are available, but for this article we focused on Windows Mobile 2003, the OS used by many popular Pocket PC devices that have wireless networking capabilities (such as the Dell Axim X3i reviewed in this issue on page 24). Many of the tips provided here also apply to other Pocket PC OSes, but if you see a feature listed that doesn't appear anywhere in your Pocket PC's interface, don't be too concerned. Your device or its OS likely doesn't support the feature.

Lock It Down

Pocket PCs don't offer much in the way of security, so your first task is to personalize and password-protect the device. Tap the Tap Here To Set Owner Information link on the main screen, tap the Name box, and use the virtual keyboard that appears to enter your name. Repeat this procedure for all of the other entries and then tap the Notes tab if you want to enter information regarding rewards for returning the unit if it is lost (or any additional information).

Tap OK, tap Start, tap Settings, and tap Password. Check the Prompt If Device Unused For box and use the drop-down menu to select the amount of time that passes before the password screen appears. The default password radio button lets you enter a four-digit password, which is simple to enter, but the security-conscious should select the Strong Alphanumeric Password radio button and enter a password that contains a combination of letters and numbers so that it is more difficult to guess. The strong password must be at least seven characters long and contain a combination of uppercase and lowercase letters, numbers, or punctuation to be valid or you'll get an error message when you tap OK.

Tap the Hint tab and enter a hint that will jog your memory if you forget the password. There is no Hint button on the password entry screen, but if you enter the word **hint** in the password box and tap OK, the hint appears in a pop-up balloon.

Here's the rub—performing a hard reset on the device (pressing the recessed reset button on the back) erases all data stored on the Pocket PC and restores it to its original state. That means the password is gone, too, so it's not as if a thief will be barred from using a stolen Pocket PC. He won't, however, have access to your personal information, so at least he won't be able to snoop through your files, learn your address and phone number, or steal your identity. If you really want to put contact and reward information on the device, print it on a piece of paper and tape it to the back of the Pocket PC or inside its case.

Customize The Keyboard

Unless you have one of the few Pocket PCs that comes with an integrated keyboard, it pays to establish virtual keyboard settings early so you can work with the device more efficiently. To adjust the keyboard settings, tap Start, tap Settings, and tap Input. Select Options and use the Input Method drop-down list to select one of the three types of virtual keyboards.

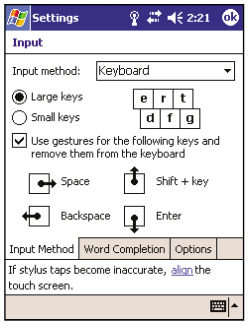
Block Recognizer is a Graffiti clone that Palm OS users can transition to easily, and the Options button doesn't do anything if this is selected. Letter

Recognizer lets you write standard alphanumeric characters on the screen or CIC Jot characters and converts them to digital text. If you select this input method, tap the Options button to access some additional features. Quick Stroke lets you write letters that normally require two strokes (such as *X*) with a single stroke. Right To Left Crossbar is handy for people who cross their Ts and other letters from right to left instead of from left to right. Allow Accented Characters lets you add accent marks to letters before they are converted.

Most people select the Keyboard input method, and there are a few settings you can adjust here to save some hassle. We prefer the Large Keys setting, which cuts down on the number of times we accidentally tap the wrong key but removes some little-used keys from the keyboard to conserve space. You can get some of those keys back by checking the Use Gestures For The Following Keys checkbox, which removes the SPACE, BACKSPACE, SHIFT, and ENTER keys. Use the strokes that are diagrammed to replace the functions of the missing keys and you should be able to input text with greater ease.

Pocket PC OSes have automatic word-completion features that can save a lot of taps and keystrokes. To modify those options, select the Word Completion tab. You can turn off the feature by removing the check from the Suggest Words When Entering Text box. Otherwise, use the drop-down menus to change the number of letters you enter before the feature kicks in or to change the number of words that are suggested.

Setting a password to keep people out of your personal information is a good idea, but the password's erased during a hard reset.



Input settings lets you use simple gestures instead of keys, such as the Spacebar, that take up a lot of space on the virtual keyboard.

Change The Hardware Buttons

Establishing the settings for the hardware buttons on the front of the unit is another important step. Tap Start, tap Settings, tap Buttons, and tap the entry for the button you want to modify. Use the Button Assignment drop-down menu to choose the program that loads when you push the button and repeat the process for the other buttons if necessary.

Select the Up/Down Control tab if you want to change the behavior of the jog dial on the side of the Pocket PC. If it's too sensitive to initial input, move the Delay Before First Repeat Slider toward the Long end of the dial and try the new setting. If it scrolls through menu entries too quickly, move the Repeat Rate slider toward the Slow end of the slider. Move the sliders in the opposite directions if the jog dial responds too slowly to input.

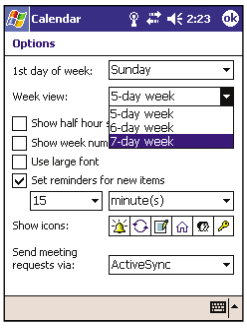
Start With The Start Menu

Many of the advanced settings in the applications and the Windows Mobile 2003 OS help you use the Pocket PC more efficiently or help you troubleshoot. This article covers most of the items that appear by default in the Start menu, but it's possible to modify those entries. Tap Start, tap Settings, and tap Menus. Check boxes for items you want to add or remove checks for items you want to remove.

ActiveSync. Tap Start, tap ActiveSync, tap Tools, tap Options, and use the drop-down menu to select the PC to sync with if you haven't already. If you sync via a wireless network, one neat trick is to configure the Pocket PC to automatically share information with your PC at specified times. Select the Mobile Schedule tab and use the drop-down menus to select the amount of time you wish to let pass before the Pocket PC automatically syncs with the PC. There also is a checkbox that makes the Pocket PC automatically synchronize with the desktop PC each time you send an outgoing email.

We recommend synchronizing often during peak times because that's when you send and receive the most email, and you can set the off-peak sync as you see fit. Tap the Peak Times button and use the weekly calendar and clocks to establish peak and off-peak hours before tapping OK.

Calendar. To adjust Calendar settings, tap Start, tap Calendar, tap Tools, and tap Options. Here you can establish the first day of the week, change from a five-day week to a six- or seven-day week, select half-hour time slots, and show week numbers. Check the Use Large Font box if you want to make the calendar more legible at the expense of showing less information and use the Set Reminders For New Items drop-down menus to settings that you prefer.



Switch the Calendar from a five-day week to a seven-day week if you want to incorporate weekend plans in your Pocket PC more easily.

Contacts. To access the settings for the Contacts application, tap Start, tap Contacts, tap Tools, and tap Options. Here you can check boxes to add or remove **alphabetizing tabs** (tabs with letters on them that you tap to access entries that begin with that letter), set the application to display only the names of contacts so more contacts are visible on-screen simultaneously, and select a larger font for viewing contacts. You also can set your area code and country.

Inbox. The documentation that came with the

Pocket PC does a good job of guiding you through the email account setup process, but there are a few other Inbox settings that are worth investigating. Tap Start, tap Inbox, tap Tools, and tap Options. Select the Message tab and use the checkboxes to tell Pocket PC how to format replies and whether or not to keep sent email. Tap the Signatures button to establish a block of text that is appended to all outgoing emails by default.

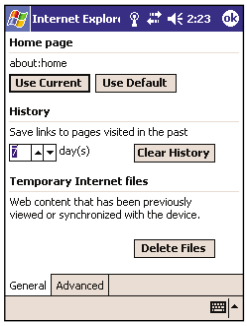
If your Pocket PC has an external storage card installed, another handy option exists on the Storage tab. Check the Store Attachments On Storage Card box to move bulky email attachments to the memory card so they don't take up precious space in your Pocket PC's internal memory.

Internet Explorer. To tweak Internet Explorer, tap Start, tap Internet Explorer, tap Tools, and tap Options. Tap Use Current to set the currently displayed Web page as your Home page and tap Clear History to wipe out your tracks after browsing the Web. To free memory space, tap Delete Files, which purges temporary Internet files that accumulate as you browse, but be aware that Web access may seem sluggish afterwards because the unit can't draw from locally stored files, and cache files re-accumulate over time so you must be vigilant in deleting them if you are concerned about memory.

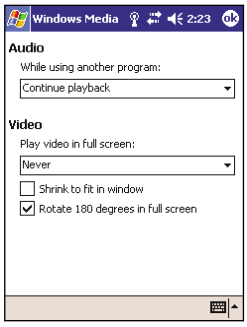
Select the Advanced tab to turn cookies on and off or to delete existing cookies. **Cookies** are small text files that sometimes track your online browsing habits. Primarily, though, online stores use cookies so they can carry your shopping cart and other information over from one page to the next as you browse their sites.

Back in IE, tap View and remove the check from the Show Images box to cut down on required storage space for cached Web pages and also to make more text visible on the small screen. Check Fit To Screen so Web pages that aren't formatted for the Pocket PC's low resolution fit better on the screen. You can also reduce the Text Size setting to make more information viewable at once.

Windows Media. Pocket PCs are multimedia powerhouses, and there are tons of settings to adjust in the Windows Media Player application. Tap Start, tap Windows Media, tap Tools, and expand Settings. In Audio & Video use the Audio drop-down menu to select if you want music to continue playing when you're working in applications other than Windows Media. Use the Video drop-down menu to tell the Pocket PC when to play video clips in full-screen mode. Check the Shrink To Fit box to force video to conform to the Pocket PC's resolution and tap Rotate 180 Degrees In Full Screen to turn video sideways and take advantage of a wider aspect ratio.



Clearing Internet Explorer's cache files can save some storage space if you do a lot of Web browsing.



Have the Pocket PC rotate video 180 degrees in full-screen mode to get a larger view of widescreen videos.

In Network use the drop-down menu to select a connection speed, and in the Buttons menu, use the drop-down menu to select a function (such as Mute, Volume Up, or Next Track) and press a button to make it perform that function when Windows Media Player is loaded. Finally, select Skin Chooser to change the appearance of Windows Media Player by applying different interface graphics (called skins) that you can download from Microsoft's Web site at www.microsoft.com/windows/windowsmedia/software/pocket/custom.aspx.

Settings. You'll access most settings for the Pocket PC by tapping the Settings entry in the Start menu. There are far more options here than we have time to discuss, but several deserve special mention. Tap Sounds & Notifications to adjust when and how loudly system alerts are played and also to adjust overall volume.

In the System tab, tap Backlight to adjust how often and long the backlight burns when the Pocket PC runs on battery power and external power and choose a short setting in the Battery Power tab to conserve battery life. Back on the System tab, tap Contrast to adjust the intensity of the display (lower settings use less battery power) and tap the Power icon to see how much battery power remains. Select the Wireless tab, if applicable, to make sure the wireless transceiver is turned off when you're not using it (this really saves on battery power) and select the Advanced tab to establish how many minutes must pass before the unit turns off automatically.

Finally, return to the System tab and tap Memory. Move the slider to the left to allocate more space to Programs, and move it right to allocate more memory to Storage. Tap the Find hotlink to search for files that take up a lot of room so you can decide if you want to delete them.

Don't Stop Now

We've only just begun discussing the Pocket PC's features and functionality, and already we're out of space. Be sure to explore the Settings options further to see if there are any device-specific tweaks you can perform. Some Pocket PCs let you adjust the speed of the processor or support other advanced features that can conserve battery power, make programs run faster, or simply make the unit easier to use. Explore these options and we guarantee you'll be surprised by the things your Pocket PC can do.

BY TRACY BAKER

Under The Palm OS Hood

The Functionality You've Been Missing

You may not have paid much attention to your Palm device's OS. You may not have even thought about it *having* an OS.

The OS provides a consistent interface for commands and a standardized translation layer for third-party software and hardware. Many OSes, including Palm OS, also offer a baseline collection of simple productivity applications. Take a minute to learn how to use the interface, explore the default options, and understand how the OS interacts with add-ons, and you'll discover plenty of functionality you may have been missing.

Palm OS was specifically designed (by Palm, now called PalmSource) to meet the low-power, small-display, and limited input requirements of handheld computing devices. Its GUI (graphical user interface) displays an alphabetical list of icons and titles organized by category. Launch applications or configuration screens by tapping the screen with a stylus or by pressing buttons on the unit's face. The included Graffiti application interacts with the text-entry portion of the screen to provide a third input option, used primarily for text or numerical input within applications. A growing number of devices also include a built-in keypad for easier thumb-typing data entry.

The most current Palm OS version is Palm OS 5, though many brand-new devices still ship with older versions. Because each manufacturer adds its own custom suite of included applications and can customize the OS' offerings, Palm OS implementations aren't as universal across hardware as other OSes. This openness helps ensure compatibility but limits flexibility and upgrade options. The basics covered here apply to most versions on the market today, though we focus primarily on Palm OS 5. And, because different devices include different application and option packages, your device may not have everything we discuss here. In any case, defer to the manual and help resources when your screen looks different from ours or when our instructions conflict with the options you see on-screen.

Navigation

Even with the advent of smartphones, multimedia handhelds, and multipurpose Palm OS devices, the primary uses of Palm-powered devices remain PIM (personal information management) functions: address books, calendars, and reminders. Hence, we'll begin with a discussion of the buttons providing easy access to common Palm OS functions. Start at Home. The OS' main screen (also called the Launcher or Applications) lists all your available software options, including standalone applications and OS configuration screens. Access it from the Home button, almost always located at the top left of the soft buttons surrounding the Graffiti writing area. Tap the Home button (represented by a stylized house icon) repeatedly to scroll through categories or select a specific group of applications from the pull-down menu at the top right of the Home screen.

The Menu button (a pictograph of a pull-down menu) is usually beneath Home. Use it to open context-sensitive menus for each application. Either from the Home screen or from within any application, tap the Menu button to see a list of menu options across the top (similar to the File, Edit, View options you're used to seeing in the Windows environment). Choose a menu type to pull down the menu of options available, and tap one to select it. Again, devices without soft buttons normally provide a dedicated keypad option for accessing context menus.

The bottom-right soft button is usually a Find option, represented by a magnifying glass. Tap it to launch an input screen for search terms. Palm OS' Find tool searches applications and files for specified text. The Find More option continues the search into Contacts, Calendar Events, Notes, and Memos. The fourth soft button varies widely in

its implementation, but it's usually something targeted at the intended specialty of the device. For example, smartphones (such as Kyocera's 7135) often use it to access phone features; basic PDAs link to the Calculator application. A few models leave its functionality open, calling the button Favorites and leaving users to define its functionality.

The original Palm Pilots, in the mid-1990s, offered four hard buttons laid out horizontally, with a directional toggle in the center. This layout is still the most common, though it's not universal. Most devices include labeling and default settings to point these buttons at Calendar and Address Book applications, plus two other options that vary widely by device. PDAs tend to use the other two buttons for accessing To Do List and Memo Pad applications; smartphones and communications devices often use them to access phone, text messaging, or Internet functionality.

Whatever the default configuration of your hard buttons, Palm OS offers a way to change or customize their actions based on personal preference. From the Home screen, tap the Prefs icon (in the System category). From the new pull-down menu at the top right, select Buttons. Next, select a default action from the drop-down menu next to each button. Most devices let you customize both hard and soft buttons. We'll cover the other Prefs configuration options below.

Options

Each Palm OS device comes with a slightly different set of applications and options. Here, we'll cover a standard and representative set native to Palm OS, excluding third-party software and utilities, in alphabetical order (mirroring screen layout).

Throughout the menu systems in Palm OS applications, tap an icon with the stylus to select it or use the directional thumbpad to navigate icons, pressing the pad to select. For pages longer than the screen, drag the scroll bar along the right side of the screen with the stylus or use the thumbpad to scroll. You may find it easier to use your thumb or finger in place of the stylus. In any case, avoid using a pen or anything with a hard tip, to prevent damage to the screen.

Palm OS isn't just for Palm devices. The OS runs on a variety of handheld devices, including this Tapwave Zodiac entertainment console.

Some hybrid devices, such as the Treo 600 smartphone, don't have Graffiti or soft-button areas, but they do provide a Home button on the built-in keypad.

The four-button layout with directional pad has become standard for Palm OS devices.

First, we need to cover system options and tools. Start with Prefs: This preferences screen sets up your device and manages overall configuration. From the Home screen, find and select the Prefs icon. Palm OS organizes the options into several categories. Go through each, configuring the device to your own preferences:

Connection. Define how the device will connect to a PC for syncing (cradle, modem, infrared).

Date & Time. Set the date and time or allow a wirelessly connected device (such as a smartphone) to automatically sync with its network.

Display. Adjust brightness and contrast to improve the screen display.

Formats. Set time, date, week, and number format options.

General. Control the auto shutdown, sound, beaming, and color-scheme options.

Owner. Enter your name and contact information in case you lose the device.

ShortCuts. Define common abbreviations that, when entered, automatically expand to their full meaning (**lu** to **Lunch**, for example). This tool lets you write in shorthand, saving both time and cramped hands.

Touchscreen/Digitizer. Periodically recalibrate your screen with the digitizer. Just follow the directions, tapping on the target as it moves.

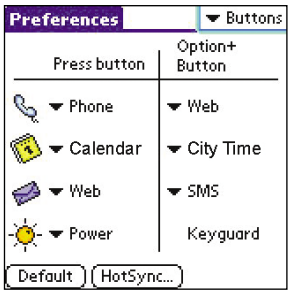
After setting up the system, manage it with system menus. From the Home screen, tap the Menu button. You'll see two menu categories: App and Options. The first controls the Applications on your device. Within the App menu, you can Delete, Beam, or Copy programs. You can also organize applications into categories and view system Info (including free memory and version numbers). From the Options menu, select Preferences to display the main menu in Icon or List form or select About to see version and copyright information.

Applications

Palm OS devices of all stripes share some common applications. We'll walk you through the pertinent options for each, with advice on how to get the most out of them. Help buttons provide context-sensitive tips and guidance; tap them whenever they appear to find out more about each option.

Address Book. The Address Book or Contacts list syncs with your PC's Palm Desktop, Outlook, or other PIM application. Starting at the main list of entries,

Duplicate, Beam, or Send categories from the Record menu. The Options menu provides access to Font, Display, and Custom Fields preferences. Use the Edit menu to Cut, Copy, and Paste text in the Address Book or in any other Palm OS application. Delete, Duplicate, Beam, or Send addresses from individual entries under the Record menu. For a neat conference trick, create a beamable business card. First, create a new Address Book entry for yourself. Enter all the information you'd normally put on a business card. Open that entry and choose Select Business Card from the Record menu. Then, anytime you want to share it, tap Beam Business Card from the Address Book's Record menu.



Customize your Palm OS device using the Prefs menu.

Calculator. You never know when a ready calculator will come in handy. Some manufacturers bulk up the standard calculator with extra modes and buttons. For more basic models, choose Recent Calculations (from the Options menu) to see a list of all the stuff you just figured out.

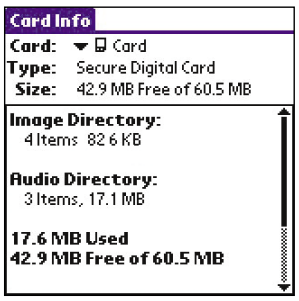
Card Info. For devices with an SD (Secure Digital) card slot, Card Info catalogs the contents and capacity of the currently inserted card. Card Info breaks items into categories (images, applications, audio) but doesn't let you access any of them directly. Use the Card menu to Rename or Format the current card.

Date Book/Calendar. The Palm OS Calendar has plenty of options. From the Record menu, create new or delete old events. Attach notes to an event, or remove them, or Purge the calendar altogether. Share meeting information by beaming an event to another user, with the Beam Event option under the Record menu. Set font and display preferences from the Options menu.

Graffiti/Graffiti 2. Train yourself in the ways of Graffiti. This Palm OS utility provides a brief tutorial and an opportunity to practice using Palm's legendary text entry shorthand.

HotSync. Sure, you know how to stick your device in its cradle and sync up. But the HotSync application lets you set several options for the procedure. From the Options menu, set up connection preferences and methods. From the main screen, tap Log to review a record of HotSync operations and their results. Finally, choose which applications and information to back up with the Conduit Setup item in the Options menu.

Memo Pad. Keep lists, reminders, and important information (such as frequent flyer numbers and favorite wines) at your fingertips. Add a memo with the New button and then Delete, Beam, or Send (via SMS [Short Message Service] or e-mail) it from the Record menu. Change fonts and security preferences from the Options menu.



The Card Info utility displays the contents of an SD (Secure Digital) card inserted into your Palm OS device.

Notepad. Jot quick handwritten notes or directions with Notepad. Create, Delete, or Beam notes from the Record menu. Using the Options menu, set an alarm, change fonts for Graffiti or keyboard-entered text, or categorize your notes with the Details option.

Photos/Pictures. Small digital cameras are rapidly becoming standard on most phones and many PDAs. Even non-camera devices have the ability to store, view, and sort digital images. From the Photo menu, view details of a specific image. You can also Delete, Rotate, Beam, or Send images. Set slideshow preferences from the Options menu.

Security. The Security option is simple, yet very important. Set a password, and decide whether or when to autolock the device. If you carry sensitive personal or business information on your device, enabling security is not an option. It's a must. Though it won't withstand dedicated and knowledgeable cracking, it will keep casual eyes from prying.

SMS. SMS is an embedded utility in Palm OS 5, though you need a connection to a wireless network to send and receive text messages from other wireless users. Smartphones and network-enabled devices have built-in support; other units will need to connect to a cell phone, modem, or other connected device. Send and Check messages from the Message menu. Manage alert settings, sort messages, and create a personal signature from Preferences (in the Options menu).

To Do List. If you enjoy making a list and checking it off, the Palm OS To Do List is tons of fun. Enter tasks using Graffiti or keypad input and add due dates, priorities, and categories with the Details button. From the Record menu, select options to Add, Delete, Purge, or Beam items. Tap Show to set display preferences.

Tutorial. Some devices include a rich tutorial on using both Palm OS and the hardware. When available, spend five to 10 minutes working through the chapters. You'll learn a lot about your device's basics and the OS that makes it run.

Welcome. The Palm OS Welcome utility steps through basic setup, including screen calibration, setting the time and date, and adjusting brightness and contrast. It will run the first time you start the device; rerun it after a reset or whenever you want to recalibrate.

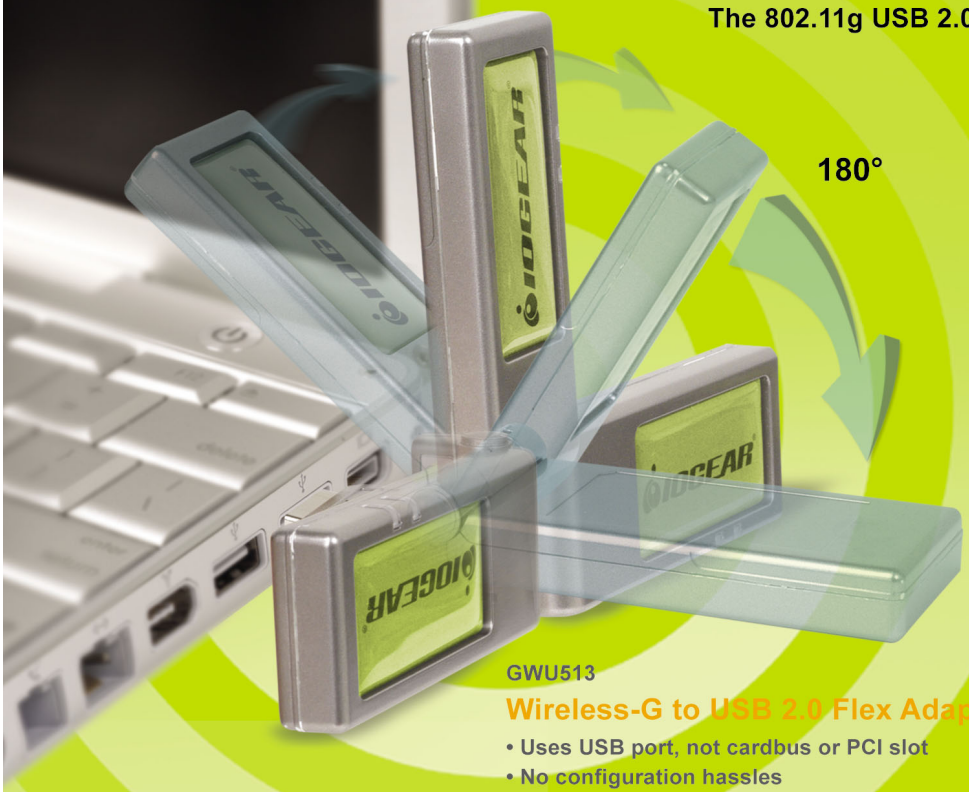
World Clock. World Clock displays up to three cities, with date and time information, selected from a default list culled from a master list of choices. Access the Options menu to change display and alarm preferences.

Whatever you use your Palm OS device for, you'll get more out of it by spending some time getting familiar with the OS and its main components.

BY GREGORY ANDERSON

Immaculate Wi-Fi Reception

The 802.11g USB 2.0 adapter with twist-and-shout flexibility!



IOGEAR's ultra fast Wireless-G 802.11g USB 2.0 adapter can help you connect to a wireless network with "higher power." It bends and twists to ensure optimal reception so you can work at up to 54Mbps at home or anywhere a hotspot is available.

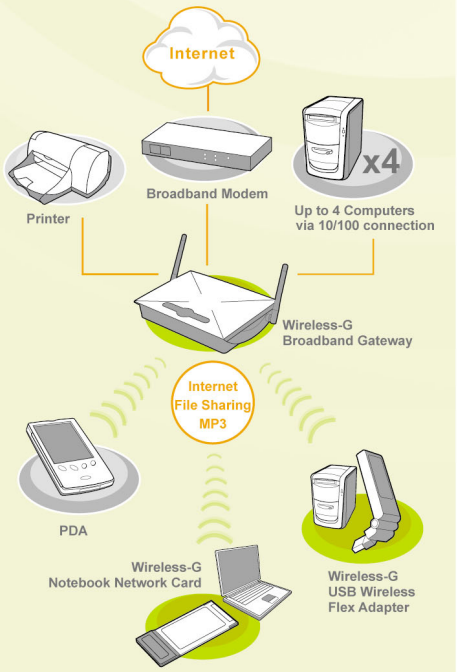
Installation takes just moments. All IOGEAR Wireless-G products offer the latest security and are backward compatible with 802.11b.

So "retire the wire" without sacrificing Internet speeds - pick up IOGEAR's line of Wireless-G products today!

GWU513

Wireless-G to USB 2.0 Flex Adapter

- Uses USB port, not cardbus or PCI slot
- No configuration hassles
- Flexes and pivots for optimal reception



GWA501

Wireless-G Broadband Gateway/Print Server

- Fast setup in just a few simple steps
- Includes everything for effortless installation
- Built-in firewall, supports WPA and WEP
- Built-in print server shares your printer with all connected computers

GWP511

Wireless-G Notebook Network Card

- Low-profile high-gain antenna achieves favorable sleek design
- Included Software Access Point allows you to turn your notebook into a wireless Access Point

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Palm OS PDA Paradigms

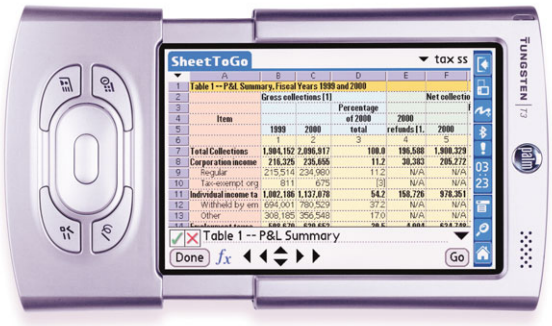
Some Of Our Favorite Palm OS PDAs

by Gregory Anderson

Sony UX50 CLIE

$599.99 • www.sonystyle.com

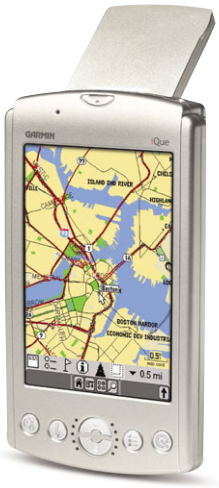
For a wireless multimedia device, it's hard to beat Sony's flagship CLIE. View photos and video with the fold-out 480 x 320 full-color display, built-in digital camera, and Memory Stick storage. Listen to tunes on the MP3 player. Or share all that good stuff using the UX50's Wi-Fi or Bluetooth connectivity.



palmOne Tungsten T3

$399 • www.palmone.com

The T3 is palmOne's high-end business handheld. It comes with an Office-compatible productivity suite, a voice recording function, SD (Secure Digital) card storage, and Bluetooth connectivity. But the screen is what really makes the T3 unique. Slide the control section down to reveal a Stretch Display that's palmOne's largest screen.



Garmin iQue 3600

$589.27 • www.garmin.com

Most PDAs can tell the date and time, but Garmin's iQue 3600 can tell where you are. Combining a PDA with a handheld GPS (Global Positioning System) unit, Garmin created a go-anywhere device that works as well outside the car as inside. It also has SD card storage and an MP3 player built in, so you can whistle while you walk.

palmOne Zire 21

$99 • www.palmone.com

For basic PIM (personal information manager) functionality, all you need is a Zire 21. palmOne's bargain PDA offers a simple interface (two buttons: calendar and contacts), a plain case, and a low price. It runs Palm OS 5, though, so there's plenty of software out there.

Handspring Treo 600

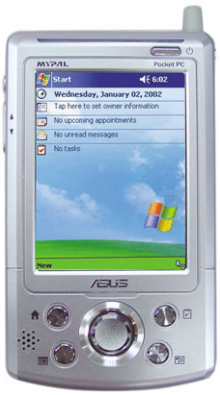
$599 • www.handspring.com

The Treo 600 smartphone is the hottest Palm OS device around. It's a cell phone, PDA, multimedia device, and handheld computer all rolled into one. Its QWERTY keypad and 64,000-color screen make data entry easy. Best of all it integrates email and browsing with wireless data service for anytime, anywhere Internet access.

Pocket PC PDA Paradigms

Some Of Our Favorite Pocket PC PDAs

by Tracy Baker



ASUS MyPal A716

$450 • www.asus.com

Expandability is the forte of the ASUS MyPal A716, thanks to many available CompactFlash and Secure Digital card modules that can add GPS, cell phone, digital camera, and other capabilities to the device. The unit is equipped with a 400MHz CPU, has 64MB of RAM for storing files, and has integrated 802.11b Wi-Fi, Bluetooth, and Fast Infrared wireless capabilities. No other Pocket PC device incorporates both CompactFlash and integrated Wi-Fi for this price.

Dell Axim X3i

$349 • www.dell.com

The Axim X3i from Dell offers powerful performance at a relatively low price, with a 400MHz CPU and 64MB of storage RAM as standard features. The unit also has integrated Wi-Fi support for connecting wirelessly to home networks that support that popular protocol. (For more information on the Axim X3i, see our full-page review on page 24.)

HP iPAQ h4355

$499.99 • www.hp.com

The iPAQ h4355 from HP has a powerful 400MHz processor and 64MB of RAM, but what really sets it apart is the integrated QWERTY keyboard. This makes the unit larger than competing models, but it's a boon if you want to use the device's integrated Wi-Fi and Bluetooth wireless capabilities to send a great deal of email.

HP iPAQ h5555

$649.99 • www.hp.com

HP's iPAQ h5555 screams power, from its 400MHz CPU to its 128MB of integrated RAM. It also comes with both Bluetooth and Wi-Fi capabilities for establishing wireless connections in nearly any type of environment. Security-conscious users will love the fingerprint identification system used to secure this expensive tool.

Toshiba e805

$599.99 • www.toshiba.com

Toshiba's e805 boasts a 400MHz CPU and integrated Wi-Fi, features 128MB of RAM, and has a relatively large 4-inch 16-bit color display. This display is unique in that it supports the standard 240- x 320-pixel Pocket PC resolution but also runs in full VGA (Video Graphics Array) 640 x 480 resolution mode. You can see more on-screen information in applications that support VGA mode (or when you've enabled a third-party resolution switcher).

ViewSonic V36

$329 • www.viewsonic.com

The V36 from ViewSonic isn't as powerful as some of its competitors, equipped as it is with a 300MHz CPU and 64MB of RAM, but at 4.2 ounces it is among the lightest Pocket PCs available. It also has an integrated digital camera that snaps 640 x 480 color photos that should be perfect for emailing via an optional Wi-Fi adapter or a desktop PC.

Improving On Reality

Photo Editors Will Sharpen Your Pictures

In the days of film, before digital-imaging equipment ruled the earth, your photos were about as immutable as stone carvings unless you had your own darkroom. But even then there were definite limits to your creative options and ability to fix glitches.

Today there's another kind of darkroom, easily constructed inside your computer. With photo-editing software, it can take just moments to accomplish the improvements and augmentations that would require hours when working in a traditional darkroom. Whether a photo merely needs a few subtle tweaks to achieve perfection, or it cries out for more extensive salvage work, a photo editor helps you make it happen.

There's no shortage of suitable editors to choose from, but as we run through some common uses, we'll focus on three of the major products. Even if you're using another program, the examples should at least give you an idea of the functions to look for.

The heavyweight champ, for PCs and Macs alike, is Adobe's Photoshop CS ($649; www.adobe.com). It's often the choice of professionals and serious amateurs. For those who don't need its power or price tag, a lighter version, Photoshop Elements 2, runs just $99.

Available for Windows only, there's Jasc's Paint Shop Pro 8 ($109; www.jasc.com), which many users find just as capable as Photoshop at a fraction of the cost. Finally, there's Roxio's PhotoSuite 7 ($49.95 standalone version, $99.95 as part of the Easy Media Creator 7 suite; www.roxio.com), a good program for beginners or anyone else who prefers a basic set of tools without the complexity of Photoshop or Paint Shop Pro (PSP, from now on).

Raw Materials

With digital photos, higher data resolution means more detail, thus higher image quality. This is particularly important if you intend to print the photos you work on, but even during the tweaking stage, high resolution gives you more data to work with.

If you're shooting digitally, use the highest resolution the camera permits. If possible, shoot to an uncompressed format. Most digital cameras have a RAW file format that does not compress the image.

If you're scanning prints, don't ignore preparation. Clean the scanner's glass plate, ideally with an antistatic cloth and cleaning fluid specifically designed for optical surfaces, although a soft, lint-free cloth spritzed with mild household glass cleaner is acceptable. Also, use canned air and photo tissue or a microfiber cloth to clear dust and fingerprints from the print. When you do the actual scan, a few guidelines will help you get the most to work with:

- Do a preview scan, so you can select only the area you want to capture.
- The dpi setting dictates quality and detail. If you intend to reprint the photos, scan at a minimum of 300dpi. If hard drive storage space isn't an issue, go for 600dpi or even higher.
- Scanning a photo to 200% of its original dimensions will also give you finer detail. For both dpi and size, you can reduce these settings later if you need smaller file or print sizes. You can never add data resolution to an existing photo file, only step down from higher to lower levels.
- Again, save to the uncompressed TIFF (Tagged Image File Format) format. If you need a compressed format, such as JPEG (Joint Photographic Experts Group), for emailing or online use, etc., keep your TIFF as a master file and make JPEG copies.

Soothe Red Eyes

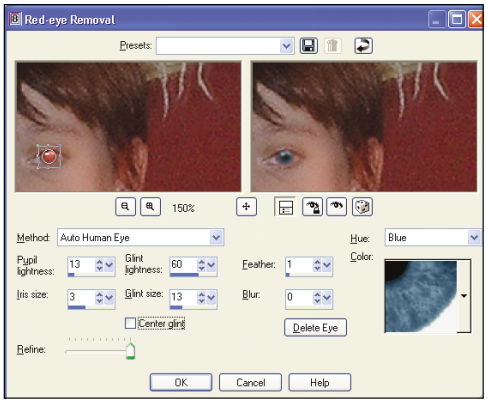
Red-eye is one of the most common photo errors and results when a camera flash reflects directly off a person's retinas. PhotoSuite's red-eye correction feature is typical of several basic photo editors, in that it walks you through the

procedure. (It's typical of the rest of PhotoSuite, too, which uses a step-by-step approach for just about everything.) With your photo opened in the workspace, click Edit in the left-side activity panel, and then choose Red Eye. Now you can try the Auto Fix button (not very satisfactory, in our tests) or use the three-step manual method, which furnishes an on-screen brush to repaint the red a neutral, dark gray.

PSP also has a dedicated red-eye fix, found under the Adjust menu, which lets you replace the entire pupil and even select the color.

Red-eye is also easy to fix starting from scratch. In Photoshop, zoom in on your subject's eyes, so they'll be easy to work with. In the program's toolbar, choose the Magic Wand selection tool, which uses color to select groups of adjacent pixels. Because red-eye usually has a uniform color, it's pretty simple to click in the red area and select just those pixels. The added advantage of the magic wand is that it will ignore white light reflections on the surface of the eye, which will help maintain a natural appearance. If there are shadings of red, you may need to raise the Tolerance setting to grab them all. (Tolerance determines how picky the Magic Wand will be when selecting pixels by color. The higher the Tolerance setting, the more inclusive the selection area will be.)

With the red area selected, recolor it dark gray. Select the Hue/Saturation controls from the Image menu and Adjustments submenu. Now experiment with lowering the Hue, Saturation, and Lightness slider values until a grayish tone emerges. Keep it subtle; pitch-black will look noticeably fake.



Paint Shop Pro's Red-Eye Removal tool is extremely flexible, letting you not only replace the red area but also configure the replacement.

Attack Of The Clones

Although you can use cloning to play such tricks as giving someone a third eye, it's an indispensable tool for retouching images and making things disappear. You can use cloning subtly; zapping a blemish on someone's cheek, for example, or erasing crud picked up in a dirty scan job. You can also use it extensively, making entire people or structures vanish from an image. It can also be handy for smoothing away obvious join lines after you've placed one image into another.

Essentially, cloning is a copy-and-paste operation, applied to **pixels** (picture elements, the basic color dots that comprise an image), and all three of our featured editors can do it. In Photoshop and PSP, select it from the toolbar. In PhotoSuite, expand the Activity Panel list by clicking Show All Features; choose Damaged Photos and then Clone.

In each editor, you'll first set your brush size and then determine the donor area. With Photoshop, press ALT and then click to reset the area. In PSP, use a right-click. In PhotoSuite, left-click to begin, and afterward use the Reset Start Point command. Then move your mouse to the area that needs the donor pixels and start dabbing or painting. As you move the brush, the donor site follows at a fixed distance until you reset, so take care not to drag it farther than you need.

This kind of cloning is more art than science. Natural-looking results require patience, practice, and usually a few Undo commands. Some tips for working with large areas:

- Distinct structures are difficult or impossible to extend. The larger the job, the more likely you'll have to confine cloning to images set against a plain background, such as using the sky to erase a power pole that appears to sprout from someone's head.
- Work from the edges inward.
- Viewed at high resolution, even static backgrounds reveal shading nuances that you should strive to match as closely as possible.
- Blend textures and shading to create a smooth extension of backdrops such as walls. You don't want to leave an obvious figure-shaped "hole."
- If you zoom in to work at high-resolution detail, zoom out frequently to gauge how your progress looks on the photo as a whole.

Cloning is also behind such photo-restoration features as Photoshop's Healing Brush and PSP's Scratch Remover, which are helpful for repairing damage (tears, scratches, stains) in scanned photos. In use, however, these tools can be subtler than straight cloning, requiring a kind of buffing action with the mouse.

Refine The Focal Point

Great photos are sometimes surrounded by lots of extraneous material. People and objects can distract from the portion of the photo that should really be the standout image, and it's only after the fact that you discover what you should've zeroed in on in the first place. Fortunately, there are some easy fixes.

Crop for detail. If you're lucky, the composition of a too-busy photo will lend itself to the easiest solution, which is saving only what you want to keep and cutting away the rest. Even the simplest photo editors have cropping tools, which let you click-and-drag to define the "keeper" region.

But these basic cropping tools are freeform in nature. You may not want a photo to end up sized to whatever imprecise dimensions result from clicking and dragging, especially if you intend to print the image on standard-sized photo paper (4- x 6-inch, 5- x 7-inch, etc.). In that case, you'll want to crop the image to a fixed size.

PSP handles this in an intuitive, yet flexible, way. With the Crop tool selected, go to the Toolbar Options palette and open the drop-down Presets menu to select from several sizes. This will put an appropriately sized selection marquee onto your photo, which you can drag wherever you wish. If you need an odd size, you can configure it yourself (in pixels, inches, or centimeters) and save it as a preset.

In Photoshop, the simplest method is to choose the Rectangular Marquee selection tool instead of Crop. In the Tool options, set the Style menu to Fixed Size, fill in the height and width fields, and click the image. To fine-tune its position, we find it easier to use the arrow keys rather than trying to drag it. Then choose the Crop command from the Image menu.

PhotoSuite's Crop function (in the Activity panel, click the Transform button and choose Crop in the drop-down menu) provides a set of fixed aspect ratios, as well as shapes you can cut to.

If you're cropping a relatively small region of the photo, you'll probably need to blow up the original in order to finish with an image of normal size. For a digital original, resize the dimensions, which you can access in Photoshop and PSP under the Image menu; in PhotoSuite, click Transform. For prints, scan them at well over 100%. Remember, the higher the data resolution, the crisper the enlarged detail will be.

Blur the background. When shooting photos, setting a wide lens aperture imposes a narrow depth of field, thus blurring a cluttered background so it won't distract from the foreground subject (or vice versa). Except things may not have worked out that way. Maybe you set the f-stop too high, or your subject was so close to the backdrop that you couldn't keep from capturing both in equally sharp detail.

With a Gaussian Blur effect, you can retroactively unfocus the background. Start by selecting everything in the photo but your subject. That may mean you'll have to use your freehand selection tool; in Photoshop, the Lasso; in PSP, Freehand Selection. (Sorry, but this one's beyond PhotoSuite's capabilities.) This will probably be a slow, painstaking process, requiring you to draw along the edgelines of your subject and along the outer edges of the photo itself; or it may be easier to draw around the subject to select it, then reverse the selection (in Photoshop, the Inverse command; in PSP, Invert).

Using a Gaussian Blur, seen here in Photoshop, you can retroactivity apply the blurring effect of a camera's narrow depth of field to keep the focus on the foreground.

With the background region selected, apply a Gaussian Blur. In Photoshop, the menu path is Filter, Blur, and Gaussian Blur; in PSP, Adjust, Blur, and Gaussian Blur. The higher the setting, the blurrier the area will become. In most cases, you can achieve photorealistic results with very low radius settings, usually just a few points above zero.

If you have several background objects at varying distances from the camera, selecting them individually and increasing the blur with their distance will leave the image looking more like the blurring was a natural result of your aperture setting.

Color Inside The Lines

Anyone who, as a kid, rejoiced in a fresh jumbo box of crayons should have a hard time resisting our programs' tools for tinkering with color. The deeper the program, the more options it has, but here are a couple that provide quick gratification.

Hue again. We've already mentioned the Hue/Saturation controls above and pointed out where to find them in Photoshop. In PSP, the path is Adjust, Hue And Saturation, and finally Hue/Saturation/Lightness. In PhotoSuite, click Overall Quality, although here you're limited to a few basic adjustments for Tint and Saturation.

With our two better-equipped programs, you can set the slider controls to target separate color ranges rather than the entire master image: blues, yellows, reds, and so on. Fiddling with the Hue slider will alter the basic color. Saturation will determine its intensity, and Lightness will lighten or darken the tone. In most cases, adjusting these settings isn't surgically precise, but it can be a lot of fun tweaking the image in general ways, making certain tonal groups warmer or cooler, recoloring them, and even leaching color away from objects to reduce them to black and white.

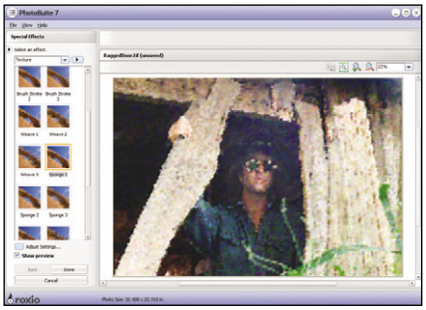
Color replacement. When you need to do more precise recoloring (say, you were caught wearing that shirt you got for Christmas from a well-meaning but color-blind relative), you can target an item and replace one color with another. Each program handles this procedure quite differently.

In Photoshop, choose Image, Adjustments, Replace Color, and then use the Dropper tool to click and select a color sample from the image. Two variations on the Dropper, marked with plus and minus signs, will let you add to the selection parameters (there might be shadings within the basic color) or exclude tones. With your sample selected, use the Hue, Saturation, and

Lightness sliders to perform adjustments. If you notice that some tones aren't yet joining in the transformation, you can include them by clicking with the Plus-Dropper. The Fuzziness slider will also help round up stray pixels.

In PSP, choose Color Replacer from the toolbar (it shares a button with the Dropper). To select the color you want to replace, press the CTRL key and right-click the area. This selection is now designated as the background color. Next, choose its replacement by clicking the

Filters can transform a photograph's appearance into that of an altogether different medium. Here we see a portrait as it looked originally, and after Photosuite's Sponge filter gave it the look of a stipple painting.



color panel in the Materials pallet, by default docked along the right side. This selection is designated as the foreground color. Now you can opt to either paint in the new color by hand or double-click to replace the pixels all at once, with the Tolerance slider determining how liberally the new color is applied.

In PhotoSuite, choose Paint & Draw and then Flood Fill. Again, the program walks you through the job step-by-step, prompting you to choose a fill style and a color and make tolerance and transparency settings. Then click the appropriate area of the photo to apply the new color. With Flood Fill, it's also possible to use color selection as a basis for lightening, darkening, and saturating areas.

Filter Fitness

Each of our photo editors comes with dozens of filters that you can use to apply changes to an entire image, or just part of it, after using a selection tool. Photoshop takes top prize with around 100 entries. PSP lists 80 under its Effects menu. PhotoSuite (Edit, Effects, and Special Effects) has preset variations on 93 types, although 30 of these are simple tints.

Included are traditional photographic techniques such as Solarization (extreme overexposure to generate bizarre colors and highlights) and increased graininess, plus filters that create optical distortions, apply textures, give photos the appearance of paintings, drawings, posters, and much more.

All of them beg to be experimented with, and anything you do and don't like can easily be undone.

Call in for reinforcements. Some editors let you supplement their built-in functions with plug-ins. There are numerous plug-ins available for photographic work, but among our favorites for general improvement and reworking are AutoFX's Mystical Lighting and Mystical Tone Tint And Color ($179 each, $299 together as Mystical Bundle; www.autofx.com). No worries about compatibility-they're cross-platform, and not only work as plug-ins with Photoshop and PSP (plus Corel Photo Paint) but also as standalone programs.

In some instances, the effects in Mystical TTC (38 total) and Lighting (16) overlap the capabilities of our higher-end editors, although quite often they're easier to find and implement for quick results. For instance, TTC has tools specifically for enriching blue skies and green foliage. And Mystical Lighting goes well beyond our editors, letting you perform extensive tricks with added light rays and flares, shadows, and environment effects such as rainbows and mist.

See It Through

Few photos are so perfect straight from the lens that they won't benefit from a nudge or two in the right direction. Even nothing-special photos can find new life when rendered through filters that transform them into something quite different. Half the fun of digital photography is seeing what could've been better and then making it happen.

BY BRIAN HODGE

Bringing it all together: Five plug-ins from AutoFX's Mystical Bundle give this lighthouse shot a new look. In order of use: Mystical Tone Tint And Color's HSB Adjust and Color Mixer and Mystical Lighting's Shader, LightCaster, and Mist.

CE DEJARGONATOR: Interpolation

Modifying the size of digital images doesn't necessarily yield attractive results, but it is at least possible thanks to interpolation. Digital images comprise **pixels** (picture elements), which are the dots of color that collectively form the image. The easiest way to increase or decrease the image size is to increase or decrease the pixel size; however, doing so is problematic because large pixels start to look blocky and can then make the image look blocky or grainy when you view it close up. Creating pixels that are smaller isn't always possible.

Interpolation solves these problems by inserting additional pixels into an image when its size is increased, which artificially increases the image's **resolution** (the number of horizontal pixels by the number of vertical pixels), or by removing pixels from an image that's size had been decreased in order to decrease its resolution. For example, to double the size of an 800 x 600 (800 horizontal pixels x 600 vertical pixels) resolution image, interpolation adds pixels to double the resolution to 1,600 x 1,200. The process of adding pixels to or removing pixels from an image is called **resampling**.

Interpolation works by using one of a variety of algorithms that use color information from nearby pixels in the image to determine the color of the pixels to add to the image when it's scaled up, or to determine what pixels it should remove from the image when it's scaled down.

Most image-editing programs with interpolation abilities let users select from one of several interpolation algorithms, including Nearest Neighbor and Bicubic. The following illustrations show the visible differences between these two common interpolation algorithms.

BY TRACY BAKER

Original Image

This is our original image, which we blew up in Photoshop to four times its original size using the Nearest Neighbor and Bicubic interpolation algorithms.

Nearest Neighbor

The **Nearest Neighbor** algorithm, which determines the color of new pixels based solely on the color of pixels adjacent to the newly inserted pixels, shows its weaknesses in this sample by displaying jagged edges on every curved surface in the image. Note the stairstep lines (aliasing) and blocky image artifacts in the eyes, on the hat, and in the baby's nostrils.

Bicubic

Bicubic interpolation, which samples from a larger area to determine the color of new pixels, represents a much better choice for photos. Although this is somewhat blurry compared to the original, much of the detail is retained and image artifacts are kept to a minimum.

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Pictures With A Camcorder

You'll Need The Right Tool For The Job

Digital technology has revolutionized the camera and camcorder industries, and it also has turned pipe dreams into possibilities when it comes to using a single device for both taking pictures and recording video. Many digital cameras and camcorders sold today can do both, so some may wonder why they would need to purchase both types of devices. Learn just a little bit about the underlying technology and its limitations, however, and you'll immediately know why today's digital-imaging devices simply aren't fit for pulling double duty.

From The Inside Out

The heart of every digital camera and camcorder is its CCD (charge-coupled device), which uses a grid of photosensors to filter and interpret incoming light so it can be converted into a digital signal. Many people think of digital memory media or digital tapes as the "film" of digital cameras and camcorders, respectively, because that is where pictures and video are stored, but the CCD behaves most like film. Its size determines the maximum size of the captured pictures or video, and its sensitivity to light, brightness range, and other specifications affect overall image or video quality.

In terms of size, each square (called a **photosite**) in the grid that makes up the face of the CCD theoretically captures one pixel of information. It's theoretical because in color CCDs each photosite has a red, green, or blue color filter applied to the top, arranged in what is called a **Bayer pattern** (see the "CCD Styles" sidebar on the next page). This arrangement lets the CCD capture full-color images, but because it takes a minimum of four photosites to create one full-color pixel, the image's overall resolution is compromised. Overall color fidelity also suffers because there are twice as many green photosites as red or blue photosites.

Sony has attempted to alleviate this problem somewhat by incorporating both standard green and lime-green color filters into some of its digital camera CCDs to achieve more accurate colors, but it's still a compromise. A company called Foveon (www.foveon.com) uses what it calls X3 technology to layer red, green, and blue filters vertically so that each photosite captures a full range of colors.

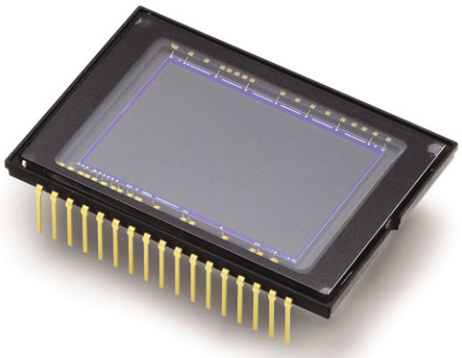
Some camcorder manufacturers solve these problems completely by incorporating three separate CCDs into a device: one with a red filter, one with a green filter, and one with a blue filter. Incoming light is split by a prism and directed to the three CCDs, and then the three CCD images are digitally recombined into a single full-color image or video frame. This improves overall resolution and color fidelity, but the large number of CCDs take up a lot of room, consume a lot of power, and cost a lot of money relative to single-CCD designs. For those reasons, three-CCD setups are only found on midrange to high-end digital camcorders.

Resolution

Why all this talk about CCDs? They determine the resolution of the final image or video frame, generally expressed using numbers such as 640 x 480 or 1,600 x 1,200. The first number tells you the number of horizontal rows of pixels a device's CCD captures, while the latter tells you how many vertical rows of pixels it captures. For example, a CCD with a resolution of 1,600 x 1,200 captures 1,600 horizontal pixels and 1,200 vertical pixels per single picture or video frame, for a total 1.92 million pixels. A CCD with a resolution of 640 x 480, on the other hand, captures only 307,200 pixels, so images have less detail. Think of it in terms of trying to draw circles or diagonal lines on graph paper. The more squares you have to work with (higher resolution), the smoother these sorts of curves and diagonal lines can look.

Resolution breaks down a CCD's claimed **MP** (**megapixel**) **rating**, which is a shorthand expression used to show how many total pixels the CCD captures. One megapixel equals one million pixels, so theoretically a 6MP digital camera captures 6 million pixels of resolution. In reality, many products fail to live up to their advertised MP ratings, especially if they incorporate a CCD that uses a Bayer pattern to capture color.

It is important to note that the maximum resolution a device captures is fixed, but the pixel sizes in the captured images and video are scalable depending on the type and size of the output device. A picture taken at a resolution of 640 x 480 looks very similar to a picture taken at a resolution of 1,600 x 1,200 when both photos are printed as wallet-sized or smaller pictures. Increase the printout size to 8 x 10 inches, and suddenly the 640 x 480 picture looks very



CCDs like this one serve as the eyes of digital cameras and camcorders, sensing the intensity of incoming light to create images.

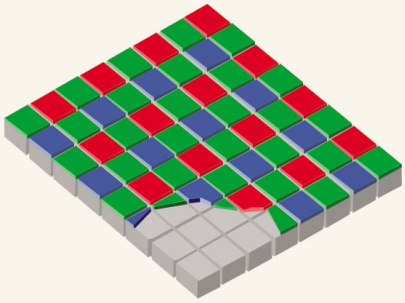
grainy and lacks detail compared to the 1,600 x 1,200 picture that still looks sharp and clear. That's because the size of the pixels in the smaller image has to be increased dramatically for the image to completely cover the larger sheet of paper, while the pixels in the larger image remain relatively small.

The main difference between digital cameras and digital camcorders is that the former tend to use high-resolution CCDs that are not ideal for recording video, while the latter tend to use lower-resolution CCDs that are not ideal for capturing still images. All the extra pixels captured by a high-resolution CCD require lots of storage space (1MB or more per image is common), so standard digital video tapes would be able to store only a few seconds or minutes of video shot at those resolutions. Even file compression, which uses algorithms to reduce the storage space required by each picture or video frame, won't alleviate this problem. Without compression, each image would eat up several megabytes of storage.

The reasoning behind using different types of CCDs in each device is simple. Digital cameras are designed to create images that are displayed on computer monitors, which have high resolutions, or to create clear printouts, which requires high-resolution source material. Consumer-level digital camcorders are designed to shoot video that ultimately is optimized for playback on a standard analog TV, which has a very low resolution compared to a computer monitor or HDTV, has different color requirements, and is different in many other ways. These TVs display NTSC (National Television System Committee) video signals that, for all intents and purposes, have a resolution of 640 x 480 and that also are **interlaced**, which divides each frame of video into two separate fields. For 1/60 of a second, each odd-numbered horizontal row of pixels is captured to create the first field, and then each even-numbered horizontal row of pixels is captured for another 1/60 of a second to create the second field. This sequence alternates until recording is stopped, creating one full frame of video every 1/30 of a second. The fields alternate when played back on an NTSC television to create the illusion of 30 solid frames of video per second.

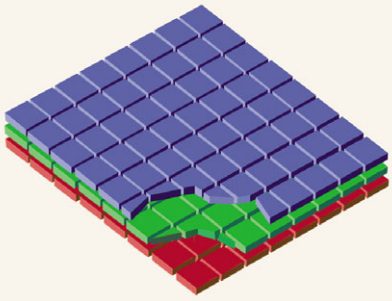
CCD Styles

Bayer Pattern



Color filters are seated atop each of a CCD's photosites using what is called a Bayer pattern, alternating red, green, and blue filters. By combining the color data and light intensity from adjacent photosites, full-color pixels are created that make a solid image when assembled. Unfortunately, because there are only three primary colors and at least four photosites must be combined for each full-color pixel, green is over-represented compared to red and blue.

Foveon X3



Foveon X3 technology layers red, green, and blue color filters on top of the CCD so that full-color information can be collected by each photosite. This theoretically leads to increased overall resolution and more accurate colors.

Hybrid products such as this Samsung DuoCam incorporate two CCDs—a high-resolution one to capture still images and a lower-resolution one to capture full-motion video.

Going Progressive

Interlacing is the other major difference that makes digital camcorders poor choices for capturing still images. Most consumer-level digital camcorders use interlaced capture, described in the preceding paragraph. But digital cameras are designed to snap entire still images at once using a process called **progressive video capture**. Some digital camcorders can capture progressive video, as well, snapping 30 full frames or more per second. But unless it is converted to the NTSC format using special software or hardware, this video will only play on televisions that accept progressive-scan signals.

Progressive-scan is obviously the way to go for pictures because the entire photo is captured at once. Some digital camcorders can switch into progressive-scan mode for snapping photos, which is ideal, but many simply capture two fields that are combined into a single frame, which can cause problems. If the subject moves while the picture is snapped, for example, the minute time difference between capturing the first field and capturing the second field can cause them to look blurry or misaligned in the final image (an artifact called **combing** because the edges of the subject resemble the teeth of a comb). This also holds true when shooting interlaced video. Try to keep both the subject and the camera as

steady as possible to avoid combing artifacts and be especially careful about whipping the camera from side-to-side in the horizontal plane.

Some manufacturers claim their camcorders support progressive-scan photos because the devices incorporate a mechanical shutter. The shutter helps alleviate interlacing problems, but it doesn't eliminate them.

Getting The Most From Your Device

When choosing the type of device you want to use to create either photographs or video, consider how you'll use the images or footage. If you just want to take a few quick pictures suitable for emailing, digital camcorders are fine because they produce images that are small enough to fit on any computer monitor and that have tiny file sizes that won't clog up the recipient's inbox. If it's a special event and you are certain you'll want to archive or print the pictures, digital cameras are a must because of their superior resolution.

Video recommendations are pretty much the reverse. Digital camcorders produce footage that you can view on any PC monitor and that you can email relatively easily because aggressive compression is used to reduce the file's size. Digital camcorders produce video that is much clearer than that of still digital cameras that can also record video. But the camcorder video also takes up a lot of storage space unless it is compressed and converted to a PC-only format.

Speaking of conversion, the right software gives both digital cameras and digital camcorders much more flexibility. Digital photo-editing software such as Jasc Software's Paint Shop Pro 8 ($99 download, $109 boxed retail; www.jasc.com) or Adobe's Photoshop CS ($649; www.adobe.com) can convert high-resolution images into smaller photos and formats that are ideal for emailing, and video-editing tools such as Ulead's VideoStudio 7 ($99.95; www.ulead.com) and Adobe's Premiere Pro ($699; www.adobe.com) do the same thing for digital camcorder video. Just remember that it is always best to start with high-quality source material and reduce its size and quality to suit your needs. It is impossible to improve the viewable size of low-quality source material without creating a lot of image and video artifacts (see last month's "Dejargonator"). The golden rule is that your images can lose detail through editing and conversion, but you can't add more detail than existed in the original image.

CompactFlash cards are available in capacities up to 8GB, which would allow for plenty of video storage space without having to use bulky tapes, but costs are still prohibitive.

Whether you take pictures or record video, regardless of the device, try to avoid using digital "enhancements" such as digital zoom and digital image stabilization. Stick to the optical equivalents, if available, as they use the camera or camcorder's physical parts to perform the adjustments. For example, an optical zoom physically moves the lens assembly to bring subjects closer, but digital zoom just artificially magnifies the size of the captured pixels, making the final image look extremely blocky and lacking in detail. Optical image stabilization physically adjusts the camera's internal parts to compensate for minor hand movements, while digital image stabilization filters the video through algorithms that make it look steady but can turn it into a blurry mess.

Convergence Is Coming

Many technological advances must be made before products are available that shoot high-resolution pictures and video with equal aplomb. Samsung's novel approach is its DuoCam series, which incorporate separate CCDs for the digital camcorder and digital camera portions of the devices. The most recent model, the VP-D6050i (pricing not available; www.samsung.com) takes pictures using a 5.25MP CCD but switches to an 0.8MP CCD for shooting video. The one drawback to these multi-CCD combinations is that the device must be large enough to hold all that equipment, so they're not especially portable devices.

Engineers must find ways to add vast amounts of storage space to digicams before they will be suitable for shooting high-quality video. MiniDV camcorders use 3.125MB of storage space per second of recorded video, which translates to 187.5MB per minute and 11.25GB per hour. Memory card media will be available in sizes ranging all the way up to 8GB by the time you read this, but the media is pricey. An 8GB SimpleTech CompactFlash card (www.simpletech.com) has an expected retail price of $5,999, while MiniDV cassette tapes are available for less than $7 each. The tapes are too large to incorporate into small digital cameras and don't allow for quick random data access, so until high-capacity hard drives start showing up in digital cameras, expect to stick to the camcorder for video and the camera for pictures.

The surging popularity of HDTV ultimately may be the biggest factor driving the creation of devices that shoot great pictures and video. HDTV uses higher resolutions than NTSC (a minimum of 1,280 x 720) and also supports progressive-scan formats. Future camera and camcorder combos equipped with high-resolution CCDs to capture HDTV video should also be able to take high-resolution pictures, and progressive-scan abilities will greatly improve still-image quality (not to mention video quality). Until then, you can buy bulky hybrid products such as the DuoCam or keep lugging both your digital camera and camcorder to events so you'll always be equipped to get that perfect shot. CE

BY TRACY BAKER

The Producers

Which Video Editor Will Make Your Movies Into Masterpieces?

Computers are great for editing things. No matter what kind of resource you're working with (documents, Web sites, photographs, ripped CD tracks), part of the magic of the PC lies in changing the original file to suit your preferences or in merging elements of multiple resources into a composition for viewing or playing by others. Editing video is very much about combining various elements and manipulating those elements for the sake of making them fit together in a unified whole.

Given the technical complexity underlying movie and video production, today's consumer-level video software is remarkably easy to use and remarkably effective at helping you develop the final product you want. To get started, just get some video clips from your camcorder, a VCR or DVD, or a free clip resource on the Web and then load it into your editing software and work with the editor's features. You might only want to cut out the unnecessary footage (and if you've ever shot video, you know how much of that can accumulate), and these editors can help you not only do this, but also stitch together the remaining pieces. But they can do much more, as well. With any decent video-editing program, you can add narration, a music sound track, transitions between scenes, special effects, and titles, with each element tied precisely to times and events.

Not only that, but increasingly these editors do all the work themselves. Feed them a video file and, if you wish, some additional sound and a few titles, and the software will create a finished video for you. Your automatically generated music video won't likely make the top rotation list on MTV, but at the very least, it nicely demonstrates your program's capabilities, showing you the possibilities for your own productions.

Here we examine the most recent releases of several consumer-level video editors. At the outset, we'll just say this: You can't actually go wrong with any of them. They all let you create a finished video. The differences lie in features, options, speed of execution, and overall look, feel, and usability.

Pinnacle Systems Pinnacle Studio version 9

Pinnacle is in the video-editing business in a big way, with its $999 Liquid Edition Pro software competing with other higher-end products such as Adobe Premiere. Pinnacle Studio has long been regarded among the best of the consumer-level video editors, and version 9 isn't going to change many minds about that. Its first release garnered criticism because of a tendency to crash while performing specific advanced editing tasks, but updates (currently 9.0.8) seem to have solved most of those issues. But not all. We managed to crash Pinnacle 9 when opening the Photos And Frame Grabs display, and it took several seconds for the Disc Menus display to appear.

Even so, this remains a top-notch program. The clean, highly attractive interface of the previous editions remains just as clean and just as attractive here, and when editing on a monitor with 1,600 x 1,200 resolution, you get a strong sense of working with a professional product. This thing flat-out looks great.

As is typical with video editors, you can work in Storyboard or Timeline mode, but Pinnacle's Storyboard view differs somewhat from that of the other products. Pinnacle doesn't differentiate among types of elements on the storyboard; instead, whatever type of clip (video, graphic, or title) you add to it appears in its own frame along a continuing filmstrip. Also unlike other products, however, Pinnacle has the Timeline as its default view. Essentially, you are *expected* to work in this view, using its different track types, such as video, title, sound, and music, to compile your video. Pinnacle separates the video and audio track of captured clips very effectively, letting you work on them individually or even separate them completely. To work on the setting of any clip, right-click it and choose Clip Properties. The dialog box for that clip type rises at the top of the main window.

Your options are numerous. You can grab individual frames from your DV camcorder or a DVD. You can add music directly from CDs. You can output to tape, DVD, AVI (Audio-Video Interleaved) or MPEG (Moving Picture Experts Group) files, or Windows Media or RealVideo files. You can capture and create video in a 16:9 format for widescreen viewing. The SmartSound tool lets you create background music automatically,

Pinnacle Systems Pinnacle Studio version 9
www.pinnaclesys.com
$99.95

giving you a set of clips that Pinnacle will merge together smoothly in whatever style you choose. In a further nod to today's need for automation tools, Pinnacle offers a music video creator, letting you choose styles ranging from fast-paced to slow and romantic, and all you need to do is add the video and music tracks. Pinnacle synchronizes and coordinates the rest.

The program does have one particular, and potentially important, negative. It lets you work only with videos in the AVI, MPEG, or MPEG-2 formats. If you've been using Windows Movie Maker 2 as your starting video editor, creating video files in its native WMV (Windows Media Video) format, you won't be able to use those clips. The idea, of course, is that you'll let Pinnacle capture directly from your DV camcorder, but an import tool would be welcome. In fact, importing media except through capture is not elegantly handled at all, with the Help system not even mentioning it. You need to browse for files, but the Browse button is anything but readily visible.

Studio 9 ships with the company's Hollywood FX 5, a separate application that lets you edit effects to add to your Pinnacle Studio videos. This feature shows a focus of Pinnacle Studio 9 on effects, and indeed you'll find yourself in front of your screen playing with the program's video effects until your eyeballs hurt. It really is that much fun, and the results can be spectacular.

Because of the import restrictions, and the two or three crashes we experienced, Pinnacle Studio 9 did not make our Editor's Choice. Otherwise, it would have done so. It's a very fine program.

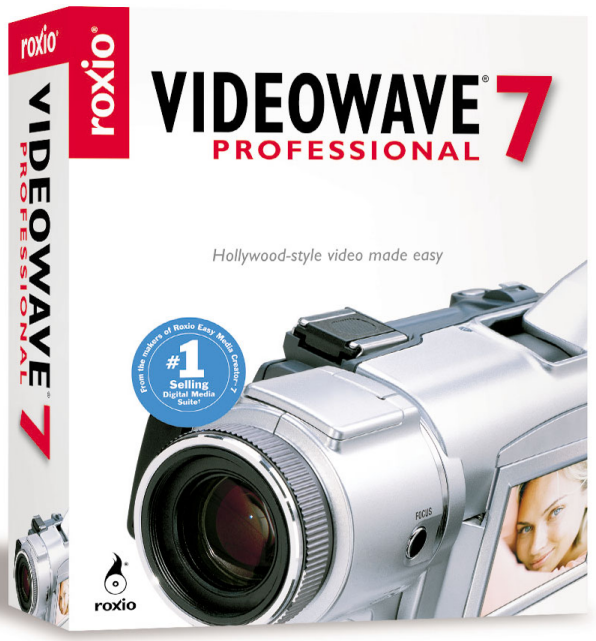
Roxio VideoWave 7

Roxio VideoWave 7 ships as part of the Easy Media Creator 7 suite of programs, which includes the company's always-popular Easy CD Creator. And this is an actual suite, not just a bundle, with all components working together seamlessly. VideoWave 7 provides the editing portion of a bundle that takes care of all the CD and DVD production needs below the nonprofessional level. Roxio also sells VideoWave 7 separately, for $79.95, but according to the company, it is precisely the same as the product included in the Easy Media Creator 7 suite.

VideoWave 7 features a clean, attractive interface, with easy to understand icons and a crafted, beveled overall shape. Some will find it a bit too in-your-face, perhaps, or maybe too cartoonish, but like the rest of the Roxio Easy Media Suite, the large, colorful icons and window borders are designed to help anyone, even newer PC users, figure out quickly what has to be done.

And what has to be done, as is the case with nearly all video-editing applications, at least at this level, is to drag various video clips, sound files, effects, and transitions from a gallery to the storyboard or the timelines. In VideoWave, the gallery is called the Media Selector, and the storyboard is called the Storyline, but this fundamental principle is identical to Windows Movie Maker 2, Pinnacle Studio 9, and Ulead VideoStudio 8. VideoWave parts company from the others in its interface stylings and a few other features, but also in the way it handles automatic media creation.

VideoWave's Storybuilder Production feature walks you through the process of creating a video, providing a numbered list of steps to add the media and then another to produce the final copy. Its CineMagic feature takes this process a step further, asking



Roxio VideoWave 7
www.roxio.com
$99.95

Sony Screenblast Movie Studio 3.0
www.screenblast.com
$99.95

Sony Screenblast Movie Studio 3.0

Sony has taken over both the Screenblast Movie Studio and the Acid music/sound editor from SoundForge, whose products Sony acquired in 2003, and offers them both under the Screenblast label. Indeed, you could use Movie Studio 3 in conjunction with Acid 4.0 in order to create solid videos with excellent sound. Such a combination would prove especially strong for anyone who wants to develop low-cost music videos, working with Acid's well-regarded recording studio features to build the music tracks and then importing these tracks into Movie Studio.

In fact, the strongest selling point of these programs is their heritage. Acid 4.0 is a stripped-down version of Acid Pro from which musicians get the well-known term "Acid loops." Movie Studio is a basic version of Vegas, the highly regarded video and sound editor. Both Acid Pro and Vegas sell for much higher prices than their lighter versions, but the essentials remain the same. The result: strong quality.

Even by itself, without its Acid partner, Screenblast Movie Studio gives you everything you need to produce decent videos. The Pan And Crop feature lets you cut away needless information from a clip's edges, letting you focus on the clip's subject more clearly. You can slide events in the video independently of its underlying media in order to synchronize them precisely as you wish. Drawing from the music-editing software paradigm, Movie Studio lets you automatically save multiple takes of a video or a sound creation, letting you choose one or the other or edit each of them.

Movie Studio 3 publishes directly to your hard drive, to DVD or Video CD, or to DVD or DV tape (like most video-editing programs), but also to a Sony Memory Stick or Giga Vault product or to the Screenblast.com video publishing site, a very useful service if you want to share your videos with friends or family members. You can also export video in Macromedia Flash format for later editing in Flash and eventual publication on the Web.

Screenblast Movie Studio 3 provides excellent feature menus (such as transitions), strong editing options, solid choices in effects and text options, and superb tutorials. It renders its video more slowly than Pinnacle Studio 9 or Ulead VideoStudio 8, and that's certainly an issue if you create numerous videos. But even at that, if you're in the market for a video-editing program, you simply have to consider this one.

Ulead VideoStudio 8

Like Pinnacle Studio, Ulead VideoStudio has been around for quite some time. While VideoStudio's eighth iteration adds some useful and very welcome features, it maintains the unconventional interface of its earlier versions (although not unconventional to owners of those versions, of course) and at least one of those versions' quirks, as well. The primary concerns in the past have been the speed with which you can drag and drop clips and features onto the storyboard, and this problem is clearly solved in the new version of VideoStudio, and also the length of time between clicking a video's play button and the time the video actually starts playing. This issue remains, for no discernible reason.

Still, there's much to like. The big interface buttons at the top of the screen show you all the items you need to be concerned about in creating and publishing a video: Capture, Edit, Effect, Overlay, Title, Audio, and Share. Clicking any of these buttons reveals the interface specific to that task and nicely isolates the task while you're working on it. The interfaces of other products tends to remain much the same as you move from task to task, the philosophy being that all elements are part of the same unified video in the long run. But

you to add video and audio clips and choose a style and then processing the files into a completed video, performing the edits, adjusting tempo, adding transitions, and synchronizing audio. The results are impressive, although in most cases you'll want to plan your selections ahead of time to make sure they really do work together. The old adage, "garbage in, garbage out," still applies, and even excellent media choices often clash when you merge them. But the CineMagic feature lets you try a variety of possibilities, with your task only to choose the best one.

In practice, the VideoWave application proved fast at creating videos and storylines automatically, but its interface in general proved sluggish from click to click. Furthermore, the Help system could have been more detailed. Still, there's enough here to get you into video making in a big way, and combined with the other tools in the Roxio Easy Media Creator 7 suite, VideoWave is an attractive choice.

Free Video Editors

Likely to the chagrin of all consumer-level video-editing software publishers, Microsoft's free Movie Maker 2 offers a good set of features at an incredibly good price: free. The original Movie Maker ships with Windows XP, and upgrading to version 2 (a necessity if you actually plan to make some videos) costs nothing more than the time it takes to download the program. Because it's free, it's the program that sets the bar for other video-editing programs. After all, if a program can't beat Movie Maker 2, why would anyone pay for it?

Available from the Accessories folder once you install it, Movie Maker 2 offers an interface similar to most other editors, including Pinnacle Studio 9 and Ulead Video Studio 8, but with a larger area for clips and effects icons. You get one track for video (with its audio track separated), a Title track, and two audio/music tracks (you can use one for narration). Quick to learn and smooth to use, Movie Maker 2 represents an ideal beginner's environment and beyond, and as you might expect, it offers especially strong support for creating WMV files.

If you intend to move into professional video production, at some point you'll need to learn about the professional-level products from Avid Technology. As a free download, the company offers Avid Free DV as an introduction to its higher-end Avid Xpress DV ($695) and Avid Xpress Pro ($1,695) programs. The software appeals especially to educational institutions, particularly those whose students will find themselves in production situations with full Avid suites or custom-designed Avid studios, but it's available for anyone at www.avid.com/freedv. The free version offers two video and two audio tracks, 16 effects, and QuickTime encoding only, so it's significantly stripped down from Avid's expensive versions, but it lets you become conversant with Avid's interface (which is much different from the other products reviewed here) and capabilities. ■

because these are very much different tasks (just ask a professional video producer), there's something practical and intelligent about keeping the appearance of separation. Besides, even though the larger part of the program window changes when you switch tasks, you always have full access to precisely the same storyboard or timeline, so it's still very clearly an integrated process.

Several useful features make this program worthwhile. You can add a customized Pan and Zoom to each clip, controlling it to look amazingly natural. Clicking the Edit screen's Filter tab reveals a wealth of filter effects, each of them represented by an animated icon that lets you see exactly what the filter will do. If you want a mirroring effect or an oil paint effect, just drag and drop it. You can also create a file consisting of only the audio portion of the video, which is useful if you want to edit the audio by itself or burn it to CD for listening elsewhere. One possible change for a future version of the interface might be to reduce the size of the Preview screen in favor of more real estate for clips and other icons, but as it is, there's a cleanness to the program's look that appeals to us.

Ulead has developed and maintained a perennial favorite, different from the rest of the offerings in many respects and attractive to its users partially for that reason. With increasing competition, this program might very well be due for a complete overhaul, but it remains usable, full-featured, and worthwhile.

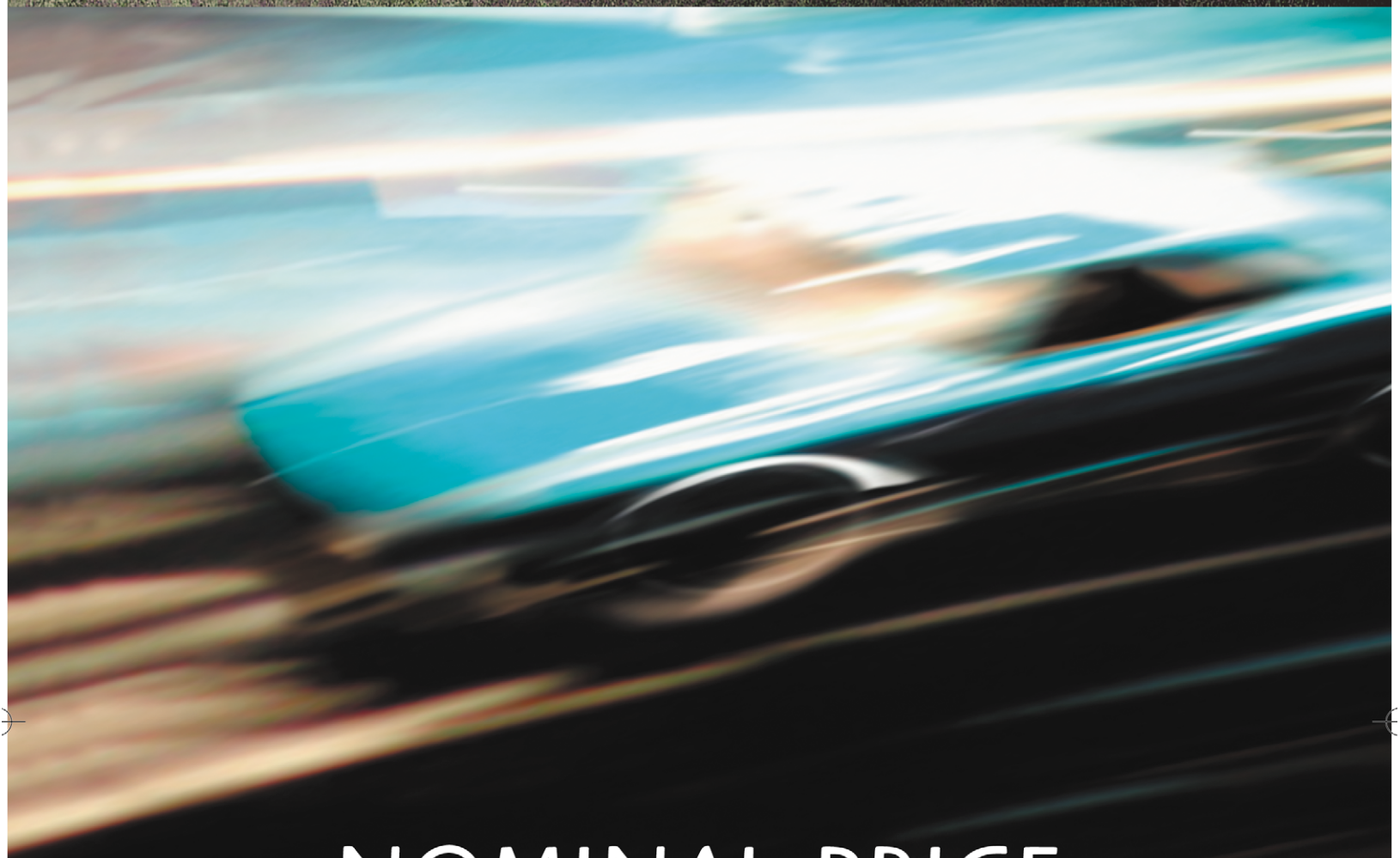
Ulead VideoStudio 8
www.ulead.com
$99.95

Our Choice: Sony Screenblast Movie Studio 3.0

With its wealth of import options, its attractive and useful interface, its excellent tutorials, and its ready tie-ins to audio-editing software and to the Screenblast video-sharing Web service, Screenblast Movie Studio 3.0 is our top choice among the products we reviewed. It lacks an automated video creation facility, and it renders videos more slowly than Pinnacle or Ulead's products, but the rest of the package makes up for these shortcomings. That said, any product in this roundup will serve you well, so don't hesitate to consider any of them. CE

BY NEIL RANDALL

MAXIMUM PERFORMANCE



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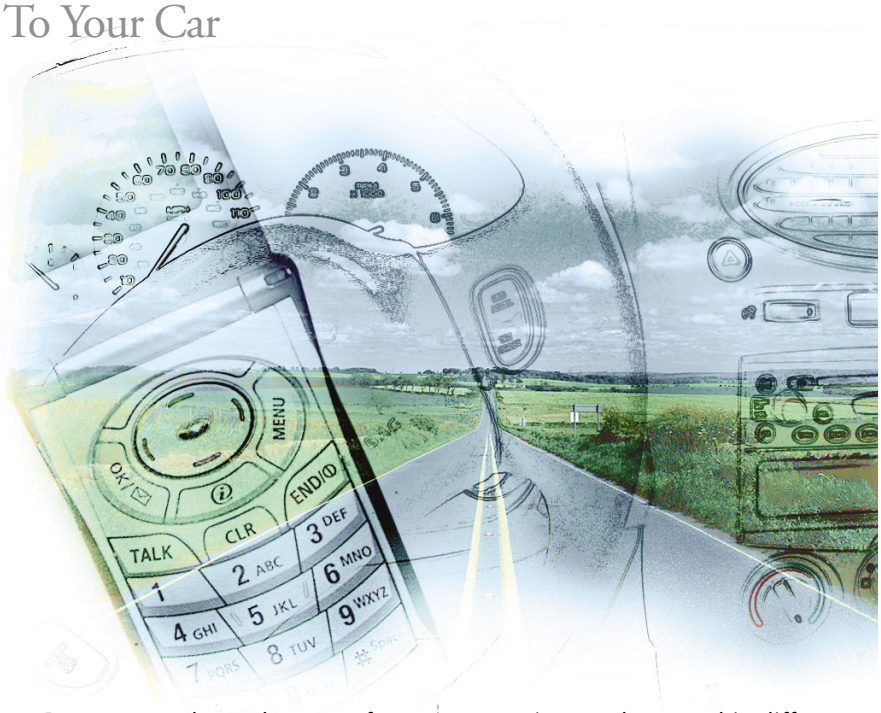
Bluetooth Hits The Road

Automakers Wirelessly Connect You To Your Car



Once used merely to get from point A to point B, the car today is as much a rolling showcase of the latest consumer electronics technologies as it is a means of transportation. It is not uncommon for new cars to come equipped with DVD-video players and surround-sound audio systems, satellite radio, and advanced navigation systems. Now automakers are adding a short-range wireless networking technology named Bluetooth to cars to link cell phones to car stereos and enable the driver to make or answer calls while keeping both hands on the steering wheel. You can get it as an option in a variety of the 2004 model year cars now, and the selection of cars that incorporate Bluetooth is slated to grow even larger in the 2005 model year.

But just as there are big differences among cars in features, performance, and styling, there are big differences in how the car industry is implementing Bluetooth technology, even among cars from the same brand. Some cars are taking Bluetooth to a higher level than other cars.

Moreover, the number of uses for Bluetooth in cars is expected to increase as the auto industry adopts even more Bluetooth-enabled consumer electronics products and as Bluetooth innovations migrate from concept cars to production vehicles.

Cell Phones & Driving: Safely Paired

Bluetooth is a short-range wireless networking technology that is used to connect two or more devices, and it is meant to replace the cables that would otherwise be used for the connection. For example, Bluetooth can replace the parallel port cable or USB cable that may otherwise connect a PC to a printer. Bluetooth works only if the devices are within approximately 30 feet of each other, and it can't carry a huge amount of data. Its bandwidth (the connection's capacity to carry data) is only 1Mbps (megabit per second); by comparison, a Wi-Fi wireless connection works within a range of 100 feet to 300 feet and offers bandwidth of 11Mbps or more. (Wi-Fi is meant to share Internet access among devices, not to replace cables.)

Named after the Danish king Harald Bluetooth, who lived in the 10th century and forged links between warring tribes, Bluetooth technology was developed by engineers from a variety of companies under the auspices of the Bluetooth SIG (Special Interest Group). So-called "device profiles" and antennas developed by the Bluetooth SIG must be built into the devices before they can share a Bluetooth connection. Among the devices that manufacturers can equip with these profiles and antennas are cell phones, PDAs, computers, computer printers, and now cars.

With many people making cell phone calls while driving and several states cracking down on the practice through laws that ban the use of handheld cell phones while driving, automakers have turned to Bluetooth as a way to safely connect a driver to a cell phone call.

A compatible Bluetooth-enabled phone is required, and the user must initiate a pairing process that makes the phone and the car recognize each other. But the pairing is done only once. Thereafter, whenever the phone is in the car and switched on, a driver can use the phone to make or receive a call without ever touching it.

Where To Get It

Right now, Bluetooth is available in vehicles from Acura, Aston Martin, BMW, Chrysler, Dodge, Jeep, Ford,

Lexus, Lincoln, Mercury, and Toyota, either as a factory-installed feature or as a dealer-installed option.

For example, in the 2004 model year, Bluetooth is a standard feature in the Acura TL and a factory-installed option in the 2004 Chrysler Pacifica and LH, Dodge Durango and Ram, Jeep Liberty, Toyota Prius and Land Cruiser, and the Lexus LS430. It is also a built-in feature in the Lexus LX470's navigation system.

Bluetooth can be added as a dealer-installed option in other 2004 model year cars, such as the BMW 3 Series coupes and sedans, the BMW X5, all Lincoln cars and SUVs, the Ford Explorer and Expedition, Mercury Mountaineer, and MINI Cooper and Cooper S.

This summer BMW plans to offer Bluetooth as a dealer-installed option in 3 Series convertibles, the X3, and the Z4 roadster, says Gordon McDonnell, accessory development manager for electronics at BMW of North America.

More 2004 Ford and Mercury cars also will get Bluetooth as a dealer-installed option later in the 2004 model year, says Janice Cutting, product strategy manager for vehicle personalization at the Ford Performance Group of Ford Motor Co.

In the 2005 model year, Bluetooth is expected to be available as a factory-installed option in even more cars, including the Chrysler 300 and PT Cruiser, the Dodge Dakota and Magnum, Chrysler and Dodge minivans, the Jeep Grand Cherokee, and select BMW models. Plus, Ford is considering offering Bluetooth as a factory-installed option, but not in convertibles, Cutting says, because it is too difficult to mount the microphone without a roof structure, which is the usual location for the microphone.

In addition, some dealers may retrofit older cars with Bluetooth. Chrysler first introduced its Bluetooth system, which is called UConnect, in 2003 as a dealer-installed option for any of its vehicles sold since 1994. BMW dealers can install Bluetooth in any of the 3 Series coupes or sedans, the 2003 5 Series cars built since March 2002, or any X5 built since April 2002. "We will expand these kits this summer to include additional models and vehicles from the 2001 model year forward, up to the kits we offer today," McDonnell says.

Also, some cell phone manufacturers, including Sony Ericsson, Nokia, and Motorola offer Bluetooth adapters that fit all cars.

How It Works

Fundamentally, every car that has Bluetooth uses a standardized Bluetooth technology, so the ability to make and receive calls via a Bluetooth cell phone is the same in every car. However, there are notable differences among the available systems. Some of these differences even appear among cars from the same brand.

In every instance, a microphone installed somewhere in the passenger cabin transmits the driver's (or other passenger's) voice to a Bluetooth control module installed somewhere in the car. The control module, in turn, is connected to a Bluetooth antenna, which transmits the driver's voice to the cell phone, which works in the usual way to connect the call. In the other direction, the Bluetooth controller transmits the voice of the person at the other end of the conversation to the car's audio system to be heard through one or more of the system's speakers. When a cell phone call is coming in or is initiated, anything already playing through the audio system is muted automatically.

But beyond that basic functionality is where the similarities end and the nuances begin. Some examples:

- BMW's vehicles use a manual, push-button process for pairing the phone to the car, whereas in the Acura, the pairing is done almost entirely with spoken commands.
- The BMW and Toyota systems can be paired with up to four phones, the Lincoln can be paired with up to five, the Acura can be paired with up to six, and the Chrysler can be paired with up to seven. (All systems maintain a wireless link with only one phone at a time.)

Bluetooth-Enabled Cars

Bluetooth in cars is not new for 2004, but as you can see, there are plenty of new models that use the technology. We've listed several cars that either come with Bluetooth standard (as noted) or as an option (for which we've listed the price). Makes and models for which Bluetooth option pricing is not available are listed as N/A.

2004 Models

Acura: TL (standard)
BMW: 3 Series Convertible, Coupe, and Sedan, X3 and X5 SUV, Z4 roadster ($650 plus installation)
Chrysler: LH, Pacifica, PT Cruiser ($275 factory-installed; $299 dealer-installed)
Dodge: Durango, Ram ($360 Durango; $275 Ram [for UConnect system])
Ford: Expedition, Explorer (N/A)
Jeep: Liberty ($275)
Lexus: LS430 sedan, LX470 SUV (Navigation system required: $2,000)
Lincoln: All cars and SUVs ($399 plus installation)
Mercury: Mountaineer (N/A)
MINI: All cars ($450 plus installation)
Toyota: Land Cruiser SUV, Prius hybrid sedan (Navigation system required: $3,350 Land Cruiser; $3,150 Prius)

2005 Models

Acura: RL (standard)
Aston Martin: DB9 Coupe, DB9 Volante (standard)
Audi: A6, A8 (standard)
Cadillac: STS ($6,000 for STS Luxury package including Bluetooth)
Chrysler: 300, minivans (N/A)
Dodge: Dakota, Magnum, minivans (N/A)
Jeep: Grand Cherokee (N/A)

- The Acura system, named HandsFreeLink, stores up to 50 names and phone numbers in its own onboard directory and lets the driver dial the phone by calling out a voice tag. But the Lincoln system, named MobileEase, the MINI system, and the Chrysler UConnect system all store up to 32 names, each with up to four associated phone numbers, although they all permit voice-tag dialing, too.
- Barge-in, the ability to dial new digits while a call is in progress, is not possible in the basic BMW 3 Series system, the UConnect system, or the MobileEase system, except with the cell phone's keypad. However, if a 3 Series car is equipped with an optional navigation system, barge-in is possible using soft keys on the touch-sensitive LCD, McDonnell noted. (The standard radios in the X3 and X5 already are equipped with such soft keys, so ordering the navigation system isn't necessary to get barge-in capability with Bluetooth in those vehicles.)
- In the Acura TL, in Chrysler Group cars equipped with a navigation system, and in the Toyota and Lexus vehicles, Bluetooth is integrated with the navigation system such that it's possible to call a point of interest found in the navigation system's database by touching a soft key on the navigation system's screen.

Prices for the Bluetooth options also vary widely. For example, BMW charges $650 plus an installation fee. The Chrysler Group charges $275 for the factory-installed UConnect and $299 plus labor when the dealer installs it. To get Bluetooth in Toyota's cars means buying the navigation system for $3,150 in the Prius or $3,350 in the Land Cruiser. Lexus charges $2,000 for its navigation system.

Mix & Match

Another big consideration when shopping for a car with Bluetooth is the cell phone you'll be using. Some cell phones work better with particular cars than other cell phones. Also, cell phones equipped with the Bluetooth hands-free device profile provide the greatest compatibility with vehicles because that profile lets the phone share more of its features with the vehicle than the other device profile, the headset profile, used to connect phones to cars. The Bluetooth SIG developed the hands-free profile at the urging of the automakers who are members, according to Mike McCamon, executive director of the Bluetooth SIG.

The automakers test and certify Bluetooth cell phones for compatibility with their vehicles. BMW provides its list of approved phones to its dealers only. Toyota, Lexus, Acura, and Ford post their lists on the Web.

In researching this article, we successfully paired the 2004 Acura TL, BMW 330xi, Lexus LX470, and the 2005 Chrysler Town and Country and Chrysler 300 with Sony Ericsson Z600 and Siemens S56 cell phones. In addition, we successfully paired the Lexus with a Nokia 3650 and the Acura and BMW with a Sony Ericsson T616.

On The Horizon

Some of the differences among the various cars' Bluetooth systems will disappear in the future, McCamon says, when an updated hands-free profile is released. The new profile will afford better integration of the cell phone's address book with the car's Bluetooth controller, for example.

In addition, McCamon notes, Bluetooth-enabled portable digital audio players are coming later this year, and the automakers are examining ways to link to those devices, for example, to let the driver pump his favorite MP3 songs through the car's stereo.

Further in the future, automakers are already envisioning using Bluetooth for everything from automatic remote control of the car to advanced safety systems.

Volvo used a Bluetooth-enabled remote control in a concept car it unveiled at the 2001 Detroit Auto Show. Within 30 feet of the car, the remote control could transmit personal settings for the driver's seat, steering wheel, and pedals via Bluetooth. Last year, Volvo unveiled how a Bluetooth key fob could be used to unlock and start another concept vehicle. A 2004 concept car from Volvo, shown at the 2004 New York International Auto Show last April, used Bluetooth paired with a PDA or a laptop computer to share an appointment calendar, for example, to set up an appointment with the dealer's service department.

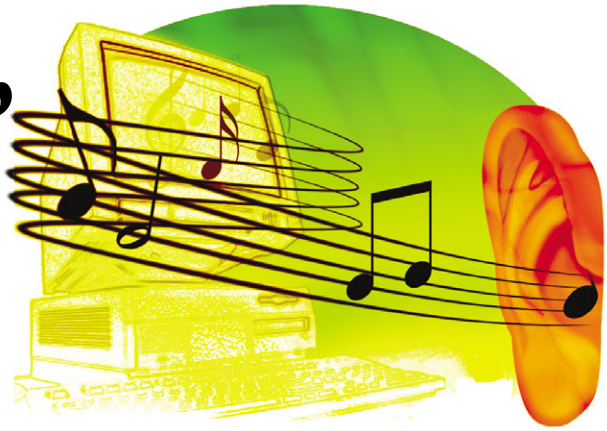
A car with a Bluetooth connection can sync your cell phone to your car's communications system.

Ford, meanwhile, displayed at this year's New York auto show a 2003 concept SUV with a Bluetooth hands-free phone system linked to a mechanism that could divert calls to voice mail if it sensed a dangerous situation requiring a driver's immediate attention, such as an impending loss of traction.

Driving conditions aside, Bluetooth is doing its part to make cars safer by letting drivers concentrate on driving instead of dialing. Moreover, with a growing number of cars slated to feature the technology in the year to come, it's safe to say that there appears to be no impending loss of traction for Bluetooth in cars. CE

by Robert E. Calem

Sounding Off, Part II



Get Started With Digital Audio

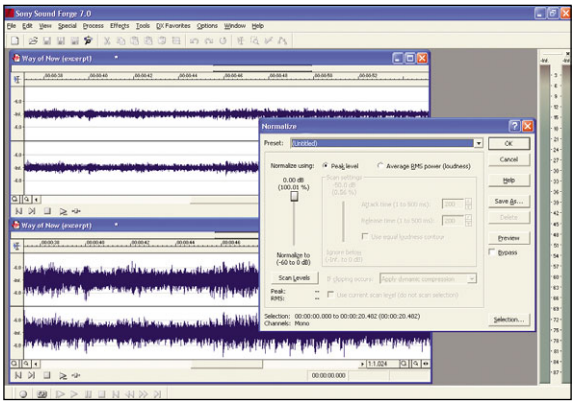
Last issue we ran through the basics of using your computer as an audio workstation. We suggested various products and product categories to consider, depending on the type of sound work you want to undertake: recording music, narration, or other audio; editing the audio tracks of home video; creating sound effects for home or business projects; and so on.

This time we'll address some fundamentals of working with digital audio. Our examples will mainly center on two leading audio editors mentioned in Part 1, but most tips should translate to other programs, such as multitrack recorders and budget editors. On the Windows platform, we used Sony Sound Forge 7 ($499.95; www.sony.com/mediasoftware); on the Mac, BIAS Peak 4 ($499; www.bias-inc.com). Although there isn't a cross-platform audio editor in their class, the programs have numerous features in common.

Yes, they're pricey, but they're also indispensable all-purpose tools for digital sound enthusiasts. Not only do they record stereo audio, but they also let you rework audio files with many of the same options familiar from word processing and photo editing: cutting, copying, pasting, cropping, and subjecting the material to extensive processing.

Both programs support video, too, so you can open DV files and tinker with their audio while keeping an eye on the picture. For editing DV audio, Sound Forge and Peak are superior to the stock capabilities of even high-end video editors because they can zoom in on audio at the sample level. (A **sample** is the smallest increment of recorded sound; for DV audio at 48KHz, that's 1/48,000 second.) The 1/100-second resolution of many video editors may seem precise, but not when you need to edit audible glitches that last only two or three samples.

Both editors have useful extras, including large libraries of impulse files (we'll get into those later), and they facilitate CD burning.



The effects of Normalizing in Sound Forge. The top selection is a low volume stereo file that gets no louder than –9.5dB. At bottom, Normalizing to 100% maximizes the audio's volume while preserving the natural dynamics.

If you're on a tighter budget, both manufacturers sell trimmed-down versions. From Sony, there's Screenblast Sound Forge ($69.95). At BIAS, Peak LE ($99) handles the budget end, and Peak DV ($199) occupies the middle ground, omitting some features from the flagship program but supporting digital video.

Absolute Zero

In digital audio, the value zero is vital. Understanding its relevance is the first step toward keeping your audio clean and under control.

Volume. There's more than one way to measure digital audio's volume, but the main level to be aware of is 0dBfs (zero decibels full scale). Commercial recordings are mastered so their highest volume peaks never exceed zero or top out at a fraction of a point below it.

When you're recording your own sound, watch your audio software's input meter, adjusting the input as needed so that it remains in negative territory. Optimally, the highest peaks will flutter within a decibel or two of zero, without going over into the red zone. This lets you take full advantage of the software's data resolution (usually 16 or 24 bit) and make the most accurate recording possible.

What happens when you exceed 0dB? Typically, you'll hear an ugly pop or crackle that's caused by the top of the sound wave being clipped away.

If you're making a multitrack recording, be aware that the combined volumes of its individual tracks will cumulatively raise the overall master volume. (In a **multitrack recording**, you record the various instrumental and vocal parts of a song separately, each to its own track. Then, when mixing the song, you combine all the individual

tracks into a master track, for normal stereo or surround listening.) So, in your multitrack song, let's say you start with one track—percussion, for instance—and its highest levels reach –2dB. With just this one track, the volume of the unchanged master output (neither raising nor decreasing volume) will also be –2dB. That's fine; you're still in negative territory. But now let's say you build your song and record 10 more tracks—guitars, bass, keyboards, vocals—all at –2dB. Their combined volumes definitely won't cause the master playback to sound 10 times louder, but it will exceed zero by several decibels, so you'll need to reduce the levels of the individual tracks to keep the master level under control.

The zero crossing. When you open an audio file in an editor and zoom in close enough to see the sound wave's individual cycles, you'll see that they cycle above and below a central horizontal line. This is the **zero crossing**, the threshold between the wave's positive and negative values.

When you're editing files, respect this line. In practical terms, it represents silence. If you're deleting a section of audio—a cough during narration, for instance—confine your edit points to zero crossings. That way the truncated sound waves will line up at both ends and keep the waveform cycling more smoothly. If you cut a waveform in the middle of a peak or trough, you can introduce a noticeable pop or click.

Fortunately, our featured editors can automatically look for zero crossings. In Sound Forge and Peak alike, make sure you've activated the Auto Snap To Zero command under the Options menu.

Here are a few more editing tips:

Zero-crossing principle. The zero-crossing principle applies when you're inserting new audio. Make sure the added section integrates into the existing sound wave at zero crossings.

Repair a sloppy edit. Or when you're editing a stereo track, you may discover that the zero crossings of the left and right channels don't line up. You can avoid a pop or click by reshaping the wave around the ragged edit. Both editors have a Pencil Tool in their toolbars, with which you can redraw the wave into submission. If you're using an editor without a Pencil Tool, see the "Sound Wave Surgery" sidebar for more information on redrawing waves.

Keep track of your place. When you're editing at such a microscopic level, it can be easy to lose your place. To keep track of where you are, both editors let you place markers wherever the cursor line is set. In Sound Forge, press the **m** key; in Peak, press COMMAND-M.

Get rid of unwanted sound. When polishing digital video, you may have a sound you want to get rid of (a clunk of gear, for example), but it's a bad idea to cut audio alone. The bigger the cut, the more you'll throw the picture and sound out of sync after the cut point. Instead, find a section of audio consisting solely of quiet room ambience, copy a portion that's the same duration as the noise, and use it to replace the offending section.

Dynamics Control

When audio novices compare their work to professional recordings, the discrepancy they usually point out first is the difference in volume. Pro recordings sound so much louder. There's only a certain amount of volume that anyone can squeeze out of digital media, but you can get the most out of yours with two separate but related processes.

Normalizing. The Normalize command (in Sound Forge, under Processes; in Peak, under DSP) boosts volume by expanding a soft recording to fill the available headroom. Say you have a recording that hits its highest peak at –8dB. By normalizing to 100%, you would scale up the overall volume so the peak now hits 0dB, leaving the entire track sounding noticeably louder.

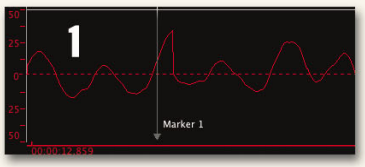
Compression. When audio is normalized, the relative volume for everything within the track remains the same. Two sonic events that are 20dBs apart in the unaltered recording will still be 20dBs apart after normalization. Compression, on the other hand, clamps down on volume peaks so you can increase the overall volume—in effect narrowing the dynamic range by making loud parts softer and soft parts louder.

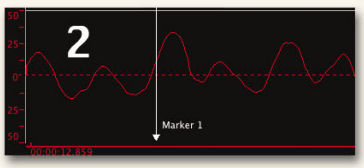
The basic principle is this: When the audio volume exceeds a threshold you've set, the compressor regulates the volume's increase according to a specified ratio. Let's say your threshold is –20dB and your ratio 3:1. Therefore, for every 3dBs that exceed your threshold on input, the output volume raises by just 1dB. The result is a more consistent overall volume with fewer and smaller fluctuations. Used well, compression helps boost volume and improve clarity.

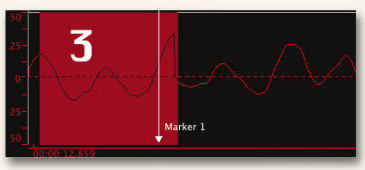
Different programs can implement compression in slightly different ways, so study your documentation for the finer points. Sound Forge's compressor

Sound Wave Surgery:

In Figure 1, a sloppy edit has left an audible glitch, visible as a jagged edge to the right of the marker. Using a Pencil Tool, we've redrawn the waveform (Figure 2). If you're using an editor without a pencil tool, there's an alternate fix. First, select a few







is the Wave Hammer, under Effects. Peak's is the Sqweez plug-in (Plug-Ins, Insert, and VST).

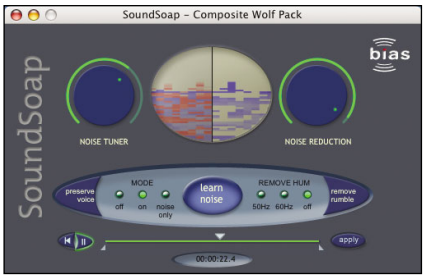
Ban The Noise

Outside of a soundproof studio, few recordings are pristine and noise-free. Even in studios, mistakes happen. Many of the noises that mar recordings are quite common: pops and clicks from various digital glitches; a 60Hz hum resulting from poor electrical grounding; low-frequency rumbles from sources, such as passing trucks; and steady background noise, such as air conditioners or motors. And when you digitize analog recordings, you'll pick up tape hiss or vinyl surface noise.

Both of the editors we mentioned have basic repair tools. Under Sound Forge's Tools menu, the Detect Clipping, Repair, and Replace options will identify and fix small glitches. In Peak, select Repair Clicks from the DSP menu. In addition to their sounds, pops and clicks usually have a distinctive appearance—a skinny, aberrant spike shooting from the waveform—so the editor has a good idea what to look for. You can also repair them manually by drawing them out with the Pencil Tool.

But other types of noise mentioned above—hum, hiss, and so on—can often permeate an entire recording and can be tough or impossible to eradicate without special noise reduction software.

BIAS SoundSoap ($99) is an easy-to-use program with a clean interface that specializes in removing consistent noise. When you click the Learn Noise button, SoundSoap compiles a noise profile and then removes just the offending frequencies. You can preview the process before applying it, fine-tuning as needed with the Tuner and Reduction buttons, using not only your ears but also the color-coded playback window. Particularly handy is the Noise Only button, which lets you listen to just the noise and make sure you're not scrubbing away too much of the keeper audio. SoundSoap is cross-platform and will operate in standalone mode and as a plug-in in Peak and Sound Forge.



BIAS SoundSoap's straightforward controls and color-coded window (blue for desired audio, red for noise frequencies) make it easy to reduce noise.

Sony's Windows-only Noise Reduction 2.0 ($399.95) bundles four plug-ins, each of which targets different situations: removes profile-based noise, repairs clipped peaks, removes clicks and crackles, and restores purity from recordings from vinyl.

Comparing both products is a bit like comparing a general practitioner and a team of surgeons. Both excel at what they do; your choice depends on your needs. One pointer: When you know that unwanted noise is intruding on your recording, make sure you get an unadulterated recording of the noise alone so that the reduction software can profile it as accurately as possible.

Sound Design

On their respective platforms, Sound Forge and Peak are industry-standard programs for effects creation for films, TV, video games, and more. Both come stocked with numerous effects plug-ins—echo delays, distortion, and much more—and accept third-party plug-ins, too.

Often, cool results emerge from blind experimentation, such as stringing together different plug-ins just to see what happens. In Sound Forge, access the Plug-In Chainer from the View Menu. Directly under Peak's Plug-Ins menu, you can chain together up to five Inserts; even better is the Vbox, a 4 x 4 plug-in matrix that enables serial and parallel effects paths, so you can simultaneously process audio in different ways and then combine the results.

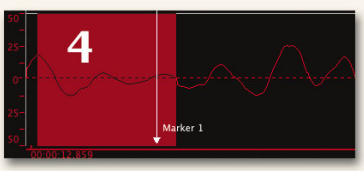
Convolution reverb is one of the handier tools, and both packages have a version of it: Sound Forge features Acoustic Mirror under Effects; and Peak has ImpulseVerb under DSP. **Reverb** (short for **reverberation**) refers to the way sound reflects within a particular space, such as a room, a stairwell, or a cathedral. **Convolution** is a process by which the properties of one recorded sound are applied to another. In convolution reverb, then, a brief recording of the reverberations in a particular space (called an **impulse file**) is applied to audio to make it sound as though it were recorded in that space. It's an effective way of giving your recordings sonic consistency. You'll also find dozens of impulse files recorded at indoor and outdoor locations in each editor.

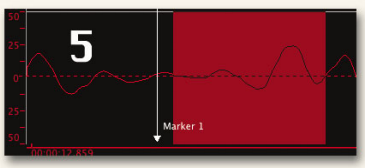
Turn It Up

Make no mistake: Audio work can be extremely complex. Professional studio engineers train for years to learn their craft, but experience is still the best teacher. By understanding a few fundamentals, you'll be better equipped to minimize early mistakes and hone your skills that much faster. CE

BY BRIAN HODGE

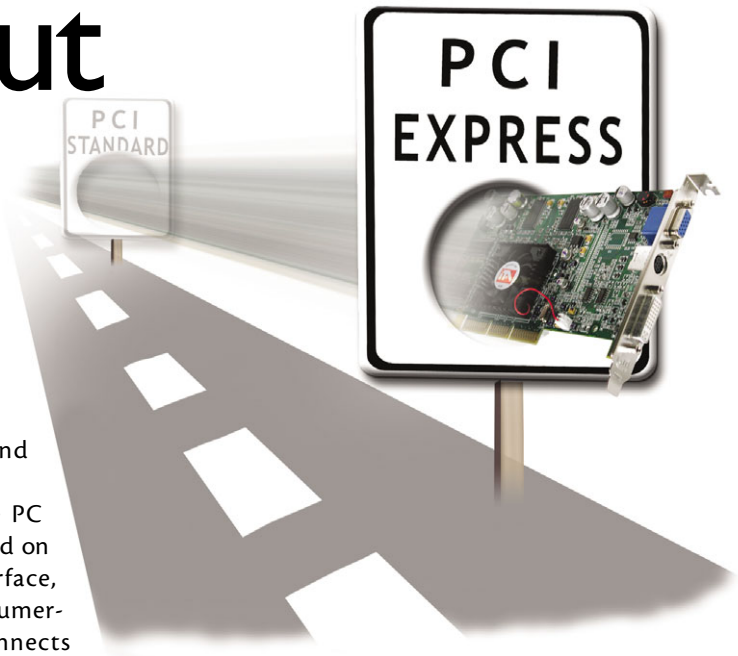
wave cycles preceding the problem edit (Figure 3) and apply a Fade Out (Figure 4). Then, select the edit plus a few cycles after and apply a Fade In (Figure 5). Because the fades occur in a tiny fraction of a second, they're too fast for the human ear to hear.





It's All About Bandwidth

PCI Express Jumps To Hyperspace For The 21st Century



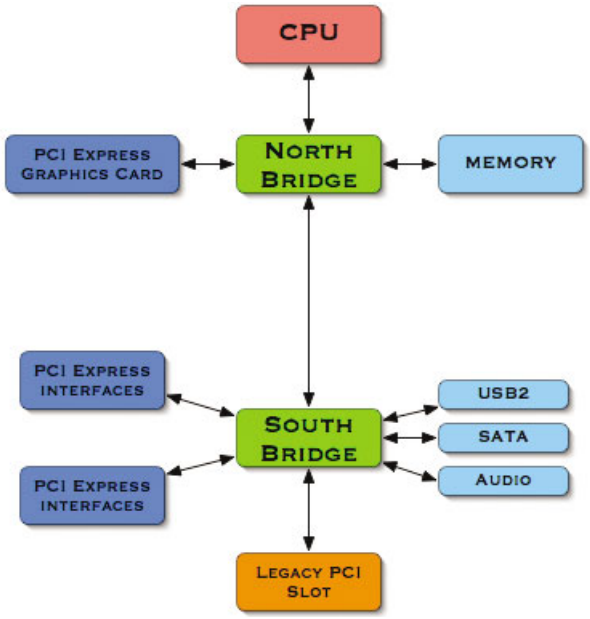
Pinch an engineer working in consumer electronics, and the first words out of his mouth (after "Ouch!") will be "I need more bandwidth." Ask your average computer user to give up her broadband Internet connection, and you'll have a fight on your hands. In today's world of high-speed communication and high-definition entertainment, bandwidth is king. And to ensure that the gear you buy can kick it into overdrive when you need it to, a consortium of electronics manufacturers has created a new standard: PCI Express.

PCI Express is a radical upgrade to the traditional PCI (Peripheral Component Interconnect) that has served the computing world for the last decade. Although PCI Express is backward compatible with legacy PCI devices, the technology behind the new interconnect standard is worlds apart from its predecessor.

Make The Connection

Interconnects are how devices, such as video cards, sound cards, and NICs (network interface cards), attach to your computer's motherboard. The motherboard also connects your RAM, your hard drive, and input devices so that they can all communicate with your computer's CPU. The faster they can communicate with the CPU, the more productive your computer is. The converse is also true; if your system's architecture is too slow, you'll be frustrated and unproductive.

Before the PC industry settled on the PCI interface, there were numerous interconnects used by various computer manufacturers. Two of the earliest were the ISA (Industry Standard Architecture) bus, followed by the EISA (Extended ISA) and IBM's MCA (MicroChannel Architecture). These ranged in speed from 8MBps (megabytes per second) to 66MBps. As the performance of key computer components (such as CPUs, memory, hard drives, etc.) increased, these speeds proved inadequate.



PCI Express bundles high-speed serial connections to create superhighways for data.

Into the fray jumped the PCI standard. Designed to consolidate the disparate bus technologies into one universal interface, the PCI has led a long and prosperous life. In geek parlance, the PCI is a 32-bit bus operating at 33MHz. In normal English, this means the PCI can send and receive 32 pieces of information 33 *million* times per second. This is approximately 132MBps. To put this into perspective, transferring the entire contents of a CD-ROM across a PCI bus would take approximately five seconds. In contrast, transferring the same amount of data across the older ISA bus would take about 80 seconds.

As the amount of information accessed by computers grew, PCI also grew, until it reached its current threshold of 528MBps in certain high-speed variants. Unfortunately, most of the high-speed variants aren't implemented in home computers.

AGP Creates A Graphical Breakout

After the PCI standard was introduced, it seemed that, at least for the foreseeable future, bandwidth was in adequate supply.

Unfortunately, technology has a way of making predictions appear foolish. The advent of 3D video cards quickly demonstrated the shortcomings of the PCI bus.

In an effort to extend the viability of the PCI bus, vendors agreed on a new standard for graphics devices: the AGP (Accelerated Graphics Port). The AGP was designed to provide a computer's video card with fast, dedicated access to the computer's CPU and memory. AGP debuted at 266MBps and has progressed to the current AGP 8X standard, which transfers data at more than 2GBps (gigabytes per second).

Computer manufacturers created AGP due to inherent limits in the way motherboards were designed. Prior to AGP, motherboards sent all their data through a single bus. As computers managed more data, this bus design became a significant bottleneck. When 3D video cards threatened to overwhelm this bus, motherboard designers implemented the AGP. This left the rest of the computer's devices to use the PCI bus for transferring data.

The result is today's standard motherboard design built around a northbridge chipset that handles the computer's graphics and system memory and the southbridge chipset that handles the system I/O (input/output). As new computer components are introduced, they are typically plugged into the computer's PCI bus.

The Need For Speed

It doesn't take Nostradamus to predict that the PCI bus will run out of steam. Today's personal computer is becoming more of an all-purpose entertainment system as vendors integrate new technology into both the hardware and software.

Among these changes is HD content, both from television broadcasts and high-definition capable camcorders. HD content in compressed form requires approximately 19.2Mbps (megabits per second) and in uncompressed form, 1.5Gbps (gigabits per second). As more consumers adopt HD technology, personal computers and media center systems will need high-speed buses to transport the content from your camcorder to the hard drive without bogging down or crashing the entire system.

The advent of HD camcorders will definitely increase the demand for speed.

In addition, computer gaming is also pushing the bounds of current PCI and AGP technology. As the sophistication of video cards increases, the amount of data they send across your computer also increases. Home computers have become more robust, with features such as RAID (redundant array of independent disks) that threaten to distress the PCI bus.

Finally, speeds on high-end home networks often approach gigabit speeds, further increasing the amount of traffic that we expect our computers to handle effortlessly. As computers move from the home office to the living room as media center devices, this convergence demands a significant improvement over the PCI standard. Streaming audio, video on demand, and other high-bandwidth technologies need simultaneous access to your computer.

PCI Express To The Rescue

A brawny replacement for the PCI standard is ready to assume PCI's mantle. PCI Express is a leap forward in performance compared to its elder sibling, yet it still retains the features that made PCI such a success.

First and foremost is backward compatibility. A motherboard with PCI Express slots will still be able to use most if not all PCI hardware, assuming the OS has the appropriate software drivers. This compatibility lets vendors implement the new architecture without worrying about slow adoption. The last thing consumers want to do is buy replacements for perfectly functional peripherals. This evolution in design is the key to the eventual success of PCI Express.

The next important criterion is affordability. Due to its design, PCI Express should be cheaper for vendors to manufacture. These savings probably won't be passed along to the consumer immediately, but the relatively inexpensive manufacturing costs make it easier for vendors to recoup some of their investment in the PCI Express design.

However, the most compelling feature of PCI Express is its sheer horsepower. Video cards using PCI Express will be able to transfer incredibly detailed images at over 4GBps, compared to AGP 8X's 2GBps. Digital camcorders, TV tuner cards, and NICs will be able to send and receive data at 250MBps. The key to achieving this burst in speed lies in the architecture of the PCI Express interface.

Parallel vs. Serial

Although PCI Express uses the same acronym as its predecessor, the underlying architecture is dramatically different. Whereas the PCI design is what's termed a parallel interface, PCI Express is a serial interface.

Parallel interfaces use a large number of wires to send and receive bits of data concurrently or in parallel fashion. The device sending the data and the interface receiving the data have to use various signaling techniques to process this data as it arrives. As speed requirements have increased, vendors have pursued two strategies to increase bandwidth. The first was to increase the amount of wires or pins that carry the data. This jump enabled PCI buses to handle 64 bits of data as opposed to 32 bits of data at a time.

The second strategy was to increase the frequency or clock rate the bus operated at. The **clock rate** of a bus is how many times it sends a signal. Initially, PCI operated at 33MHz, and subsequent improvements moved this up to 66MHz. However, these alterations to the original PCI specification weren't without drawbacks.

As the frequency and width of the bus increased, vendors had to deal with a more complex exchange of data. Timing the transmission of data across the supercharged PCI bus became an expensive challenge and was generally restricted to high-end servers or specialty computers.

PCI Express designers approached the problems faced by the traditional PCI bus differently. Instead of using a parallel design, they focused on a serial interface.

Serial interfaces use fewer wires to send and receive data. The reduced number of wires lets designers increase the clock rate far beyond what would be feasible with PCI, while reducing manufacturing costs. **Serial devices** send data in a sequential fashion, in contrast to the concurrent method used by parallel interfaces. Reducing the number of wires serves two functions: It lowers manufacturing costs and minimizes the amount of circuitry required to control the timing of data sent across the bus.

The end result of this change in architecture is increased speed. The initial speed of these serial links is 250MBps. PCI Express can also bundle these links to create an even higher bandwidth connection. These superhighways are aimed squarely at graphics cards that have a voracious appetite for bandwidth. Instead of retaining the AGP port, motherboards will have a PCI Express slot that bundles 16 connections to achieve a 4GBps transfer rate.

More Than Speed

In addition to the increase in speed, features of PCI Express make it suitable for notebooks, set-top boxes, and media center PCs. For instance, it supports both hot swapping and hot plugging. This support lets you add a device while your computer is running and replace devices that fail without shutting off your system.

PCI Express also consumes less power than standard PCI and supports power management features that will help battery-powered units eke out the most use before requiring a recharge. This lower power consumption will benefit notebook users as PCMCIA (Personal Computer Memory Card International Association) cards are replaced with cards featuring Mini-PCI Express and ExpressCard technology.

A Time To Buy

You'll likely first see PCI Express on high-performance video cards, but you may have to wait until the end of 2004 before you see widespread availability of products that take advantage of the new technology. By the fourth quarter of 2004, vendors will be shipping computers with motherboards that are PCI Express-compatible. Media Center computers will also be early adopters, especially high-end units that promise to act as a digital hub for your house. Server vendors will probably ship PCI Express-enabled systems by this summer, though. If you're an early adopter, be aware that it may be some time before you see the full benefits from PCI Express.

Life In The Fast Lane

Although PCI Express isn't a panacea for all that ails PCs and Media Center PCs, it's a welcome improvement over the original, slower PCI standard. Like owning a Ferrari in downtown New York, today's ultra-fast computers are driving in rush-hour traffic, bogged down by roads that prevent them from letting out the throttle. With PCI Express, users can put the pedal to the metal. And for many, when HD becomes a central part our entertainment world, the added bandwidth provided by PCI Express won't be considered a luxury, it'll be a necessity. Fortunately for consumers, PCI Express is an approved standard, ready to be implemented without any concerns about compatibility or future expansion. CE

BY CHRIS JACKSON

PCI-X

There's a technology similar to PCI Express in name and intentions, but different in technology and performance. PCI-X (PCI-extended) is a direct descendant of the original PCI standard, and servers, Apple's G5 computers, and some workstations already use it.

The goal of PCI-X is the same as PCI Express: to increase the amount of bandwidth available on a computer's bus, while retaining support for legacy PCI devices. The performance of PCI-X is exemplary, with bandwidth throughput ranging from 1GBps up to a current maximum of 4.3GBps.

The main difference between PCI Express and PCI-X is in the underlying technology. Whereas PCI Express uses a serial design, PCI-X retains PCI's parallel design. By operating a 64-bit card at clock frequencies of up to 533MHz, PCI-X can achieve speeds that are 32 times faster than the original PCI standard.

So why hasn't PCI-X achieved the buzz being accorded PCI Express by equipment manufacturers? In part, this is because PCI-X has its roots in the server market, where buyers are typically corporate IT departments seeking to extend the life of expensive peripherals, as opposed to the consumer market. The second is that PCI Express is being developed and marketed by Intel (www.intel.com) with additional features that haven't been a requirement for PCI-X customers. While PCI-X components have languished in relative obscurity, Intel has been aggressively marketing PCI Express. Finally, price will determine the success of both formats, and the consensus among industry experts is that PCI Express devices will be cheaper to manufacture thanks to the wider adoption by consumers. ■

Lighten Up.

It wasn't so long ago that if you wanted to bring your data with you, your hardware had to come too. Well, that's all in the past now thanks to the new SanDisk Cruzer™ Mini. At under half an ounce, the Cruzer Mini goes anywhere, and with up to 256MB of flash memory, it takes a lot with it. Hi-speed USB 2.0 compliant, SanDisk's Cruzer Mini lets you transfer data faster than ever before. And at less than 8mm thick, all it needs is a single USB slot. Just drag, drop, and go. It's all about convenience – no extra hardware, no worries.

So whether you're installing utilities or updating print drivers for the umpteenth time, you can take your files with you wherever you go – and you won't even need your dolly.

For more information on SanDisk Cruzer Mini, visit www.sandisk.com/smart

HI-SPEED CERTIFIED USB
HI-SPEED USB 2.0

SanDisk

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CE Lite

On The Lighter Side Of Technology

Compiled by Marty Sems

Loreo Photokit MK II

We've all seen him. He's the guy on the couch who no one remembers inviting to the party, yet he's been mesmerized by your roommate's View-Master for the last hour and a half. 'Tis a far, far better thing to be the one *making* the View-Master 3D content. Here's a close approximation. Loreo's $66 Photokit MK II (www.loreo.com) includes a flash camera that uses ordinary 35mm film to take split images. When your shots come back from the one-hour developer, you can put them in the special viewing box to see them in virtual 3D. Your party pics will almost look like that guy on the couch is *still there*.

FM Radio Snorkel

Last summer's Soundwaves MP3 swim goggles almost made us load up our woody and head to Surf City. What has us waxing our surfboards this year? Why, the jingle-peppered strains of FM radio, of course. Bite down on the mouthpiece of your FM Radio Snorkel from the Discovery Channel Store ($129.95; shopping.discovery.com), and let the tunes flow through the very bones of your skull. Now you can flounder around in the brine with a soundtrack. It's like there's a beach party in your mouth! (P.S. If it's still two girls for every boy in Surf City, dibs on circa-1966 Mary Tyler Moore and Shelley Fabares.)

Belkin Universal 120-Watt AC/DC Power Adapter

Don't let your power adapter plead, "wimpy, wimpy, wimpy," when your notebook bellows for "hefty, hefty, hefty." Belkin says that most aftermarket power converters are totally inadequate for today's screaming notebooks. Its response is the new Universal 120-Watt AC/DC Power Adapter ($129.99; model MP0003; www.belkin.com). Belkin says that 77% of current notebooks draw more power than common 70-watt adapters can provide, so Belkin ups the dosage with its 120W adapter. The MP0003 features over-current protection and has followed a strict planar magnetic technology diet to cut unnecessary weight and bulk. All that remains is seriously buff.

FireFly Lighted Keyboard

Though it sounds like something out of your father's pocket book on bartending, a Manhattan FireFly (www.fireflyus.com) is not a mixed drink. Until just before press time, it was the name of this USB keyboard, now called just "FireFly." It's electroluminescent, which we just discovered is an actual word. This $89.99 pretty-pretty illuminates your server dungeon or EverQuest lair with a Sapphire Blue glow. The real question is, would an infinite number of moths beating against the FireFly's glowing keys eventually replicate the works of Shakespeare? We certainly won't at the rate we're going.

Foretrex 201

Frustrated by that GPS (global positioning system) unit that's always in the wrong place when you need it? We know, we know. You still feel burned by your experiences with the GPS hat brim and the GPS belt buckle, but this is something entirely different. Really! It's a GPS you wear like a watch. Garmin's waterproof Foretrex 201 (www.garmin.com) may be a little bulky, but it weighs less than 3 ounces. It has a rechargeable, 15-hour battery, plus oodles of room to store your waypoints and routes. All this at the odd, almost Wal-Martian price of $182.13.

Ambient Orb

Is it a retro lamp? A radioactive beanbag? Or has Rover finally tracked you down to return you to The Village? None of the above, gentle reader. It's a wireless information system called the Ambient Orb (www.ambientdevices.com). For $149.95, you'll get a friendly-looking glass blob that changes color or blinks based on criteria you select from a limited list. For instance, you can instruct the Orb via Web browser or toll-free phone number to alter its hue to match your stock prices' trends, or to flash when someone is IMing you. The Orb is tied into a wireless network with broad U.S. coverage, so you don't have to slave it to your Internet connection. Check out the www.ambient411.com fan site for more ways this technology is cool. Oh, and if you would rather have analog gauges tracking your personal wealth or commute traffic levels, watch for the new Personal Dashboard late this summer.

Music & Movies

The Latest Tracks & Flicks: Are You Not Entertained?

This month our CD reviews are all about the ladies. Well, sort of. We have three new releases featuring original songs from tried-and-true songwriters and one movie soundtrack that's all about the undeniable, liberating power of a woman on a mission.

Loretta Lynn

"Van Lear Rose"
Interscope Records
www.lorettalynn.com/home
Our take: The coal miner's daughter has never been better.

Without knowing Loretta Lynn personally (and really, there are few people we wish we could more), it seems pretty clear in the 13 fantastic songs she's penned for "Van Lear Rose" that she has a new lease on life, and she's loving every minute of it. As the beneficiaries of the down-home, salt-of-the-earth wisdom only someone as genuine and grounded as Lynn can offer up, so are we.

"Van Lear Rose" is simply a stunning piece of work from a woman at this point in her career, and while listening to Lynn's voice effortlessly shift from genuine sentimentality to pull-no-punches aggression, you can't help but think that at nearly 70 years of age she is just now experiencing freedom she's never known. Think about it: Lynn married husband "Doo" (Oliver Lynn) at just shy of 14, leaving behind a now well-documented life (see "Coal Miner's Daughter" for the gritty details) of poverty in Butcher Holler, Ky. The Lynns had 48 years together riddled with love, abuse, adultery, professional jealousy, reconciliation, and eventual contentment before Doo died in 1996. And in spite of dominating country's charts for more than 40 years with an unfathomable 52 Top 10 hits and 16 No. 1s, Lynn's life was as much tied to raising six children and holding a family together as it has been being one of the queens of country. After spending most of the 1990s away from music caring for and then grieving Doo's passing, Lynn is now alone, free to explore the world without any attachments.

And exploring Lynn is. Gone on "Van Lear Rose" are any co-writers and hints of Nashville production or professional Nashville studio musicians. In their place is Lynn writing every tune with Jack White and a group of "fellers" Lynn has dubbed The Do Whaters (Dave Feeny, Patrick Keeler, Jack Lawrence, and White). Yes, this is the same Jack White responsible for the heralded The White Stripes' Detroit-fuzzed-out-blues-rock sound. White, a long-time Lynn admirer, does a masterful job of tearing away the glitz and glam to expose Lynn's raw, enchanting core. Think of what Rick Rubin did to bring generations of new listeners to Johnny Cash at the tail end of his career, and you get an idea of "Van Lear Rose" is about.

Lyrically, Lynn is simplistically masterful. When she sternly lectures a home-wrecking husband stealer with "I brought along our little babies/cause I wanted them to see/The woman that's burning down/our family tree" on "Family Tree," you know Lynn knows of what she speaks. And when she testifies, "Why, I've heard people say/Why is this tree bent/Why they don't have God enough to know/That's the way it was meant" on "God Makes No Mistakes," you know Lynn's faith is unquestionably solid. And when she chastises her man, "Well, you told me you'd be happy/Bouncin' babies on your knee/While I sit at home alone/And I've been bouncin' three" on "Mrs. Leroy Brown," you know she can spot a sorry line of bull a mile away.

Musically, "Van Lear Rose" is a dramatic yet welcome departure for Lynn compared to the bulk of her past work. Jack White amps things up considerably, especially on "Portland Oregon" and "Have Mercy," which flat-out blister with tantalizing, hillbilly blues riffs that make for sheer honky-tonk heaven. Elsewhere, White and The Do Whaters blend sultry pedal steel and Dobro guitar, bass, fiddle, and banjo into several front-porch-friendly sing-alongs, including on "High On A Mountain Top," "This Old House," and the aptly titled "Story Of My Life."

Lynn has never been shy about singing what she feels, having tackled scores of controversial-for-their-times issues when other women in country avoided the heat. On "Van Lear Rose," she does the same, just in an entirely new, creative way. At an age when most women have retired, Lynn is still trailblazing. She isn't exactly leaving the past behind, as evidenced in the touchingly painful "Miss Being Mrs." (Oh, I miss being Mrs. Tonight/Oh, and how I loved them loving arms/That once held me so tight/I took off my wedding band/And put it on my right hand/I miss being Mrs. tonight), but she's clearly on a new journey—one that just may bring country back to its roots.

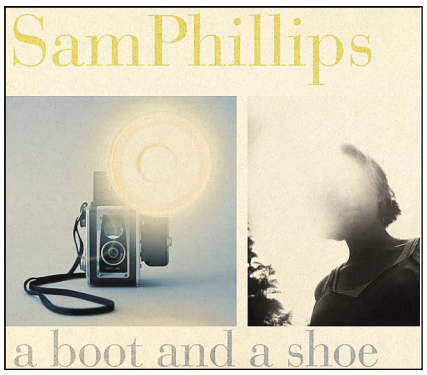
Sam Phillips

"A Boot And A Shoe"
Nonesuch
www.nonesuch.com
Our take: Great melodies; greater lyrics from a true poet.

You may not know Sam Phillips' work, but you most likely know her husband's. T-Bone Burnett is the man behind the mega-successful "O Brother, Where Art

Thou?" soundtrack and the equally engaging set of authentic Civil War-era tunes for "Cold Mountain." Burnett has also handled production chores for Phillips' recent works, including 2001's brilliant "Fan Dance," which saw Phillips moving away from the pop-saturated production of her early albums in favor of a more scaled-back sound that perfectly accompanied her thought-provoking lyrics.

The same sparseness of guitar, bass, and drum, plus a string arrangement here and there, dominates "A Boot And A Shoe," Phillips' second release for the great Nonesuch label. Above all, Phillips



is a poet and intelligent lyricist. She crafts tunes that are inviting, yet challenging with phrases that seem to have several meanings. To get the full effect of a Phillips song, your full attention is required. On "How To Quit," for example, a heavy double-beat bass drum circles a magical, circus-like rhythm around your head, yet Phillips sings, "I was broken when you got me/with holes that would let the light through." It's that kind of juxtaposition that makes "A Boot And A Shoe" so interesting.

If there's a negative to Phillips' and Burnett's simpler-is-better approach, it's that no song really breaks free of the mid-tempo stranglehold that paints the record. Without an occasional rise and fall in the pace, you begin to tune out Phillips' words, instead falling prey to the dreamy atmosphere the music creates, with "Reflecting Light" and "I Wanted To Be Alone" among the better examples. Ultimately, Phillips songs are a lot like traveling down a David Lynch highway: There's something very familiar about where you're headed, but mystery lurks around every corner.

Mary Chapin Carpenter

"Between Here And Gone"
Sony Music Nashville
www.marychapincarpenter.com
Our take: One of the best female songwriters around overdoes it.

Like Phillips, Mary Chapin Carpenter is

The Matrix Revolutions

The End Of Neo's Trio

Poor Andy and Larry Wachowski. With "The Matrix" (1999), they created the dominant techno-myth for the new millennium, garnering international acclaim and Oscar glory. Then, in May 2003, the highly anticipated sequel "The Matrix Reloaded" is released, and suddenly Matrix merchandise is relegated to department store discount bins with "Hulk" candy bars and dust-covered Jar Jar Binks figures. Six months later, "The Matrix Revolutions" debuts and all anyone can talk about is how many times they plan to see "Lord Of The Rings: The Return of the King." Talk about your fickle audience. Certainly the Wachowski brothers deserve better.

Why? Raise your hand if you actually understood everything the first time you saw "The Matrix." Yeah, thought so. Watch "Revolutions" again, and you'll realize the film blows most sci-fi action films out of the CG water. "Revolutions" begins where "Reloaded" ended, as machine sentinels are about to invade the human fortress of Zion. Sure, the first hour gets bogged down a bit in philosophical discussions of choice and balance, and some action sequences have a been-there-done-that feel. However, "Revolution's" payoff is during its second half with the siege of Zion and the Super Burly (and rainy) Brawl between Agent Smith and Neo. Decide for yourself which sequence has the more jaw-dropping visuals: watching thousands of sentinels descend into Zion or the thunderous shockwaves Smith and Neo create during their epic battle. It's all great stuff and makes you remember why you liked "The Matrix" in the first place.

Disc One contains the movie, while Disc Two includes mostly special effects features including "Revolutions Recalibrated" and "CG Revolution." "Future Gamer" promotes a new interactive video game letting players continue the Matrix story online. For those students of film, there is the "Super Burly Brawl," providing three simultaneous views of the fight between Agent Smith and Neo using storyboards, documentary-style special effects footage, and the final product. And for anyone still confused by the story to this point, there is "Before the Revolution," a useful chronology of events incorporating scenes from the superb "Animatrix" and the first two films.

Now that we're finally done slobbering all over Peter Jackson's "Lord Of The Rings" trilogy, it's time to praise the Wachowski brothers for theirs. ■

BY DAVID WHITT

Disc Specs: 129 minutes; 2.40:1 Anamorphic Widescreen; Dolby Digital; English and French Dolby Surround 5.1; "Making Of" and several special effects features; Matrix timeline; multidimensional stills gallery; preview of The Matrix Online multiplayer video game.
Studio: Warner Brothers
MSRP: $29.95

among the best female songwriters going. Unlike Phillips, Chapin Carpenter has garnered far more mainstream attention and followers, having sold millions of records, winning five Grammys (including Best Country Vocal Performance/Female), and twice being named the Country Music Association's Female Vocalist of the Year.

"Between Here And Gone" is Chapin Carpenter's first new music since 2001's "Time*Sex*Love," and it follows a path she's set since the mid-1990s that features less emphasis on country for more touches of folk and contemporary adult soft rock. "Between Here And Gone" finds the characters in Chapin Carpenter's songs coming to terms with adulthood and all the emotions that entails,

including remorse, regret, contentment, and wisdom won through mistakes.

Take "Girls Like Me." Chapin Carpenter sings, "And loneliness is like a cold/Common and no cure we're told" and later, "And when it's time to set you free/You can always count on girls like me/It's good to know a girl like me/You used to love a girl like me." Chapin Carpenter knows firsthand the solitude her character is adrift in. On "Goodnight America," Chapin Carpenter writes of the enormity of America and how we can often feel lost in the shuffle, yet there is still something so appealing about the cohesiveness and possibilities it presents.

The problem with "Between Here And Gone" is that Chapin Carpenter has so finely crafted these songs, they don't convincingly convey the edge, grit, and scars her characters have seemingly weathered, and you are left wondering where all the emotion has gone. You get the feeling that Chapin Carpenter wanted these songs to be perfect, and in that perfection none of the original inspiration has been left to feel.

Various Artists

"Kill Bill Vol. 2 Original Soundtrack"
Maverick Records
www.maverick.com
Our take: Undeniably Tarantino influenced.

Quentin Tarantino may borrow a

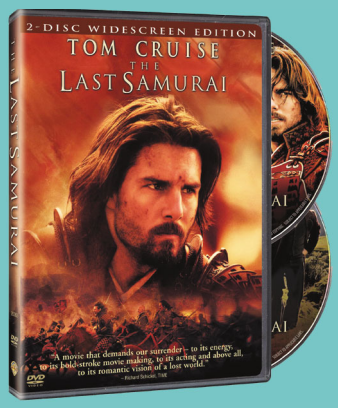
The Last Samurai

Dances With Bushido

The basic premise behind "The Last Samurai" will be familiar to anyone who's already seen "Dances With Wolves." The white man, in this case Tom Cruise as U.S. Civil War veteran Nathan Algren, goes to Japan in 1876 as an advisor to the emperor's soon-to-be modernized army. There are demons in Algren's past, and he relies on the drink to kill the nightmares and numb the guilt. In an early battle between the emperor's newly modernized "Western" army and the samurai army, led by the charismatic Katsumoto (impressively played be Ken Wantabe), Algren is separated from his inexperienced men and taken prisoner. The samurai don't take prisoners, but the white soldier is spared so Katsumoto can learn more about his new enemy.

The video quality of the film is by and large excellent with some minor halo effects. Audio is decent but did not feature as many surround effects as we had expected. We were also surprised that our subwoofer didn't shake the room during the action scenes, but this did not detract from our enjoyment of the film. Director Edward Zwick's commentary is interesting if you can stay awake. His voice is monotonous with very little inflection. The extras on Disc Two are numerous, but some of the featurettes are pretty light, and you get the feeling the discs' creators took the "more is better" approach to producing this disc. "Edward Zwick: Director's Video Journal" focuses on the details of a particular scene and goes well with his commentary track. Also of interest is the History Channel documentary, "History vs. Hollywood: The Last Samurai," which gives a less biased insight into the reality of the time. If such movies as "Braveheart" and "Dances With Wolves" float your boat, then "The Last Samurai" (rated R for violent battle depictions) is a movie you won't want to miss. ■

BY SAMIT GUPTA CHOUDHURI



Disc Specs: 154 minutes; 2.35:1 Anamorphic Widescreen; English and French Dolby Digital 5.1 audio tracks with English, French, and Spanish subtitles; full-length audio commentary by Director Edward Zwick; Disc Two features two deleted scenes with commentary (six minutes), "Tom Cruise: A Warrior's Journey" (13 minutes), "Director's Video Journal," "Making An Epic," "History vs. Hollywood" (History Channel documentary), "A World Of Detail," "Silk And Armor," "Imperial Army Basic Training," "From Solder To Samurai," "Japan Premieres" (red carpet footage from Tokyo and Kyoto premieres), "Bushido: Way of the Warrior" (text on the Samurai code), trailers.
Studio: Warner Brothers
MSRP: $29.95

healthy supply of bits and pieces from a healthy supply of film genres to create his films, but it's nearly impossible to argue that he doesn't somehow stamp his own uniqueness on all of his work, whether it's the dialogue his characters speak or the way he frames a scene or the endless ways his characters inflict violence on one another. For these reasons, people generally either love or hate a Tarantino flick. There's little middle ground to stand on. The same holds true for the soundtracks to his movies, including the "Kill Bill" duet, which finds The Bride seeking out the ultimate revenge.

From the spacious beauty and building tension that Ennio Morricone creates via spaghetti-western influenced guitar and

strings on "Il Tramonto," "L'Arena," and "A Silhouette Of Doom" to the rockabilly twang of Charlie Feathers' "Can't Hardly Stand It" to Luis Bacalov's pulsating "Summertime Killer," the soundtrack to "Kill Bill Vol. 2" reeks of Tarantino's quirky taste in music. Whatever side of the fence you fall on where Tarantino is concerned, there's no disputing that his movies are always enhanced by his personal taste.

Song choices have always been an integral part of a Tarantino movie, adding flavor to scenes that wouldn't be as effective without them. For the "Kill Bill Vol. 2" soundtrack, the songs Tarantino has chosen often tell a story within a story. The delicious crooning of Shivaree on "Goodnight Moon" is one example. The curse-laden, unlabeled finishing track from RZA is another. Sprinkled throughout the tracks are snippets of film dialogue from Uma Thurman and David Carradine, which are surprisingly effective at helping to create a cohesiveness among the various musical styles at play here.

Typically, movie soundtracks are excuses for a movie studio to make a few more dollars on a film. In some cases, such as "Kill Bill Vol. 2," the soundtrack actually enhances the flick. Love him or hate him, Tarantino knows how to make music work for his art. CE

BY BLAINE A. FLAMIG

Master And Commander: The Far Side Of The World (Collector's Edition)

Sea Battles Of Titanic Proportions

"Master And Commander: The Far Side Of The World" is a long title for a movie, but the portion after the colon refers to the 10th book in Patrick O'Brian's series of ocean-borne "Lucky" Jack Aubrey books. It's 1805, and the film begins with Captain Jack Aubrey's (Russell Crowe) ship, the H.M.S. Surprise, hunting a more powerful French ship called the Acheron on the open seas. Aubrey's journey takes him and his crew around Cape Horn to the Galapagos Islands. On the way to the final battle with the Acheron, the Surprise ploughs through rough weather, bad luck, battles, and lost lives. With only two major battles and a ship full of men, the movie doesn't sound like much. Fortunately, the filmmakers took the time to develop characters and relationships among the men, and this is what carries the movie between the action sequences. The film was nominated for 10 Academy Awards, including Best Picture and Best Director.

The video has very good contrast, although you can see some slight grain during the heavy fog and nighttime scenes. But this is a minor quibble. Audio quality is superb on both the DTS and 5.1 audio tracks (DTS is more immersive). It's the audio that helps suspend your disbelief. After a few minutes, you'll feel like you're onboard the ship as you watch the movie.

The Collector's Edition release includes the movie-only (widescreen) disc in a unique package (pictured) along with a second disc of extras. There's plenty here to keep you occupied for many, many hours, but "The Hundred Days" and "In The Wake Of O'Brian" are the highlights we recommend. Director Peter Weier's love for the subject matter is easy to see as you browse through the bonus material. The film is rated PG-13. ■

BY SAMIT GUPTA CHOUDHURI

Disc Specs: 137 minutes; 2.40:1 Anamorphic Widescreen; English DTS, English and French Dolby Digital 5.1, and Spanish Dolby Digital 2.0 with English and Spanish subtitles; Disc Two features six deleted scenes (more than 20 minutes), "The Hundred Days" (widescreen 70-minute behind-the-scenes documentary), "In The Wake Of O'Brian" (director talks about the book-to-movie transition), "Cinematic Phasmids" (art; CGI and movie techniques), "Sound Design" (with a cool interactive cannon demo), "HBO First Look" documentary, multiangle studies of the battle scenes, trailers, and more.
Studio: 20th Century Fox
MSRP: $29.95 ($19.95 for basic edition)

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Game On

Strap On Your Gloves: These Games Are Knockouts

Fight Night 2004 (PS2, Xbox)

Ali, boom-ba-yay!

Fight Night 2004 turns what could have been just another evolution of EA's Knockout Kings boxing series into a revolutionary sports title. Although the sound is arguably weak despite Dolby Digital support, the fully 3D boxers are modeled with enough detail to be instantly recognizable. And they're animated so well that players are bound to cringe when a well-timed punch slams them into the mat in a spray of sweat and blood. These improvements are minor, however, compared to the new control scheme.

Total Punch Control, which lets players throw punches using the right analog stick instead of by mashing buttons, is hands-down the best idea ever introduced in a boxing game. Players tip the stick forward diagonally to throw quick jabs, push it sideways and rotate it upwards for hooks, and pull down diagonally and then rotate it upwards to unleash powerful uppercuts. The direction of the stick movement determines the hand that swings, and after a few hours of practice everything feels natural enough that there's no chance you'll want to go back to pressing buttons. A fluid blocking system that also takes advantage of the analog sticks turns Fight Night 2004 into the most intuitive boxing game ever released, giving players tons of options without hampering them with complex controls.

Famous boxers from all weight classes are represented here, and their skills and abilities in the game match up with their real-life counterparts very well. We were drawn to the create-a-player option that let us make up boxers from scratch and model our real-life friends in excruciating detail. Created boxers can also participate in the game's single-player career mode, which lets them build up their stats as they rise through the rankings in a bid for the title belt. It would be nice if this mode was a little more fleshed out, and with any luck Fight Night 2005 will take care of that deficiency, but until then we'll be perfectly content knocking each other senseless in two-player mode. ■

BY TRACY BAKER

Fight Night 2004

$49.95
EA Sports
www.easports.com
ESRB: Teen

Harvest Moon: A Wonderful Life (NGC)

With hard work, determination, and luck, your crops can look like those on this neighboring farm.

If you like games with over-the-top action and in-your-face graphics, move along right now. Harvest Moon: A Wonderful Life would have trouble keeping pace with a glacier, and its graphics fall strictly into the strange Japanese oversized-head camp. But for those with a lot of time and a sense of adventure, this game offers a truly unique role-playing experience.

Like other games in this long-running series, Harvest Moon: A Wonderful Life puts players in charge of a farmer, starting them out with plenty of space to plant crops and raise animals. Players are free to fish, help an archeologist dig for artifacts, and do all manner of tasks other than farming to help feed themselves and make ends meet, but they'd miss out on a lot of the fun by focusing on those tasks instead of farming. By using trial and error and a little common sense, players can create seed varieties that produce more valuable crops and crossbreed animals to come up with lucrative varieties. The clock is always ticking (one second in the real world translates to one minute in the game world), and conditions change with the seasons and weather, further compelling players to achieve their goals.

The experimentation offered by this game, from farming, to cooking, to trying to forge friendships with nearby farmers and townspeople, gives it an open-ended sense that so many other games fail to capture. Maintain bachelorhood and the game ends early, but court one of the three prospective wives in town and you'll end up getting married and even having a kid with a personality based partly on that of your wife. Harvest Moon always manages to surprise, making this a game players can return to again and again provided they have the patience and mindset to deal with its laid-back yet relentless gameplay. ■

BY TRACY BAKER

Harvest Moon: A Wonderful Life

$39.99
Natsume
www.natsume.com
ESRB: Everyone

NBA Ballers (Xbox)

Real world environments (aka "cribs") are just one of the perks in NBA Ballers.

The one-on-one jamfest NBA Ballers has as much in common with a Midway coin-op fighting game as it does with NBA Street 2 and Sega's ESPN Basketball. Instead of counter-punching the Black Dragon, you juke around Stephon Marbury. If it weren't for the game's limited camera views and a slight overemphasis on style over strategy, this arcade button masher would be one of the best sports games around.

Most of the games take place at the player's own crib, and the 6,000-polygon player rendering beats anything EA Sports has ever created. You can practically count the links in Stephon Marbury's gold chain. A 36-point facial expression engine helps recreate every grin and grimace. And there are 60 current NBA players to choose from plus another 24 "NBA Legends" available, including Larry Bird and Magic Johnson (but no Michael Jordan). Game modes include career, season, and tournament options, plus a "last man standing" round that makes an obvious nod to the Unreal Tournament elimination game.

There's an edgy fighting game feel to Ballers where you have to think long and hard about which buttons you need to press, and in what order, for just about every trip down the court. There's also the same gameplay mechanic of memorizing quick button sequences and pulling them off before the other player even knows what's happening.

One of Baller's big rewards is winning the 11-point game, but you also get bragging rights for acting cool and slamming a complex dunk through the rim. The fixed sideline camera works OK, but you can't see the basket until you move in close enough. NBA Street at least let you set the camera for a down-the-court view.

Another problem is that, once you learn the button sequences, you'll find that there's not much overall strategy, which is true in real-life one-on-one basketball. NBA Live and ESPN Basketball fans will miss play calling, coaching options, or just about anything related to team basketball. That's not a major detriment as long as you know what NBA Ballers is all about: pretending to be a rich and famous basketball star with a lot of extra time on his hands. ■

BY JOHN BRANDON

NBA Ballers

$39.99
Midway
www.nbaballersn.com
ESRB: Everyone

Alias (Xbox)

Peak around corners and then sneak up on the bad guys for a one-two punch.

Sneak, shoot, talk, repeat. That's the winning formula used in Alias, the game based on Jennifer Garner's TV spy thriller. The game's mixture of style and stealth matches quite nicely with the artsy violence and murky morals of the series. While the gameplay amounts to Tomb Raider with more special moves, the stylish presentation makes Alias an enjoyable romp through an underground counterculture.

One of the game's most interesting features is that you can engage multiple foes at once. In other fighting games, the main character can only focus on one hand-to-hand duel at a time. Sydney seems more aware of side and rear attacks, and she'll swoop around, back flip, and karate-kick her way out of almost any jam. In typical network television fashion, she never actually dies in the game—(that could be damaging to the franchise). She just needs to be "evacuated."

Acclaim went to great lengths to motion-capture the main star so she moves and fights just like the real deal, which makes the game seem more life-like. The game's occasionally split screens show you alternative views, but it's more of a gimmick than a gameplay enhancement.

Graphically, Alias looks a bit like Breakdown or Enter the Matrix in that the Xbox texturing looks rather flat and uninteresting. The surround-sound audio is also somewhat sparse throughout the game. There's no multiplayer mode, which makes Alias even more like the story-driven TV show.

Unlike other Splinter Cell knock-offs, such as Rogue Spear or kill.switch, Alias finds its own flavor. Sure, you can sneak up on guards and incapacitate them, and there are gadgets galore, but Alias is more of a fighting game with a stronger story that compels you to keep playing. The controls are nowhere near as subtle and intuitive as the Ubisoft gem, but then Sam Fischer never slips into a red strapless, either. If you love thwarting spurious government conspiracies, or just enjoy jabbing obnoxious criminals in the breadbasket, Alias is for you. ■

BY JOHN BRANDON

Alias for Xbox

$49.99
Acclaim
www.aliasthegame.com
ESRB: Teen

Onimusha 3: Demon Siege (PS2)

In 2001, Capcom released Onimusha: Warlords, a third-person survival-horror game with an interesting twist: Instead of playing against a modern-day backdrop a la Resident Evil, Onimusha took players back to Japan circa the 1500s. Three years later, Onimusha 3 is here, and whether you played the first two games or not, you'll have a blast with this one.

O3 sets itself apart from its predecessors in several ways, the foremost being its revamped control scheme. Rather than relying on the antiquated D-pad system that debuted in Capcom's first Resident Evil game in 1996, the third Onimusha game (not counting Onimusha: Blade Warriors, a pure fighting game spin-off that shipped in March) takes advantage of analog control, which is much better suited to a game of this ilk. O3 also sheds the series' prerendered backgrounds in favor of on-the-fly 3D environments. The new digs may not look quite as stunningly perfect as the prior games' 2D sets, but they more than make up for it in depth and ease of navigation. The game's third major distinction is that rather than staying rooted solely in feudal Japan, the latest installment jumps back and forth between Japan and present-day Paris, France. A welcome result of this departure is the inclusion of action flick veteran Jean Reno, who provides the likeness and some of the voice work for a new character, Jacques Blanc.

Blanc fights the hordes of the underworld (led once again by arch-villain Nobunaga Oda) that burst through a time portal that also brings the original Onimusha hero, a samurai named Samanosuke Akechi, to 2004. If this sounds complicated, don't worry; the game's story takes care of itself as you carve your way through Nobunaga's dark minions, alternating between Samanosuke and Jacques.

One more thing: The six- or seven-minute computer-animated intro to this game is quite possibly the best in-game CG we've ever seen. Of course, few people buy games for pretty prerendered cut scenes, but chalk this up as one reason of many to get your mitts on Onimusha 3. ■

Jacques Blanc and Samanosuke Akechi demonstrate the super-secret demon hunter handshake.

BY CHRIS TRUMBLE

Onimusha 3: Demon Siege

$49.95
Capcom
www.capcom.com/oni3
ESRB: Mature

Red Dead Revolver (PS2, Xbox)

Red Dead Revolver is a third-person shooter that drops you into the boots of Red, a bounty hunter who as a boy saw his father and mother killed for their share of a profitable gold mine. Red's bounty hunting pays the bills, but as you can probably guess, he's always on the lookout for those responsible for destroying his family. (You'll play as several other characters, as well, but Red's the star of the show.)

The game is broken up into smallish "missions" that largely consist of your character trading hot lead with multiple bad guys in various stock Western locales. As you progress from stage to stage (no pun intended), you'll earn cash in the form of bounties and have opportunities to shop for better weapons and special items that unlock hidden features, such as new weapons or extra characters to use in the game's multiplayer modes.

RDR is a decent-looking game; although its environments and character models aren't anything special, they do the job, thanks in part to some cool touches like the grainy, washed-out look of old film that permeates the game's cut scenes. RDR's audio presentation is a little stronger than its graphics, thanks to some highly atmospheric Old-West-sounding tunes, decent voice acting, and pretty good sound effects. Control is mostly average; it doesn't really feel spot-on, but it doesn't get in the way, either.

By and large, Red Dead Revolver was a good bit of fun despite the fact that it didn't really pull us in and make us care about the story, which is a mish-mash of Western movie plots that work together with varying degrees of success. This is partly due to how fresh this game feels in the absence of dozens of me-too genre copycats and partly because Rockstar did a great job of mixing in varied gameplay styles to keep things fresh. Moving from standard third-person combat to quick-draw duels and firefights on moving trains makes it easy and fun to stick with Red in his quest for frontier justice. ■

Red's six-gun is the original weapon of mass destruction.

BY CHRIS TRUMBLE

Red Dead Revolver

$49.99
Rockstar Games
www.rockstargames.com/reddeadrevolver
ESRB: Mature

Hitman: Contracts (PS2, Xbox)

Hitman: Contracts is a game you'll likely enjoy if the previous two Hitman titles were up your alley. If you didn't care for those games, skip over the rest of this review. You're wasting your time. Hitman: Contracts is more of the same and can very easily be mistaken for an expansion pack. The intro starts with Codename 47 badly injured, remembering his past hits, and these memories are essentially the game. To that end, you'll even revisit missions you've previously played in the first two games. The graphics engine has been recycled but looks decent considering it's the same as the original Hitman game. The developers have added a few new animations, but you won't mistake the graphics for anything remotely cutting edge.

At the easiest level, the game is a breeze. But veteran players will be insulted to play at any difficulty level less than Hard. Some of the issues that were annoying in the second game reappear here. For example, the controls are not quite right and Codename 47's movement could have been tighter. There's no excuse for anything less than perfection in the third iteration of a game using the same engine. The game's inventory system is a nuisance, especially when compared to Splinter Cell Pandora Tomorrow. When all is said and done, pick up Hitman: Contracts if you loved the first two. Otherwise, save it for a rental. ■

It pays to be accurate, so aim carefully and stop shivering.

BY SAMIT GUPTA CHOUDHURI

Hitman: Contracts

$49.99
Eidos Interactive
www.hitmancontracts.com
ESRB: Mature

Manhunt (PS2, Xbox)

Manhunt was released for the PS2 last November and has only recently been released for Xbox and PC. Manhunt was pretty interesting back then but doesn't quite measure up today when compared to Tom Clancy's Splinter Cell Pandora Tomorrow (reviewed last month). In Manhunt, you play death row dirtbag James Early Cash, and the game opens on his execution day. In a twist of fate, you are not terminated. Instead, you wake from your nonlethal injection, don an earpiece, and take directions from a snuff film king named Lionel Starkweather. Seems that Lionel's picked you to star in his latest batch of films, which play out similarly to da Governator's "The Running Man."

From there you spend your time going from scene to scene avoiding the psychotic scum hunting you in the prison. Naturally, you need to sort out the most appropriate way to dispatch the bad guys (hey, you're a bad guy too). Plastic bags, glass shards, and firearms all play a part. The ideal technique to take out enemies is to sneak up behind them and finish them quickly and quietly. The violence of the death sequence is based on how long you keep your X or A button depressed.

You can pick up and hide your adversaries in a dark spot, but that doesn't seem to make much difference because other enemies aren't surprised to find their dead comrades. The premise is interesting but is never fleshed out. The graphics look pretty shoddy when compared to some of the better Xbox games available now. At the end of the day, Manhunt is well thought out, but never offers up anything more than what's already available in today's better stealth games. If you're not one for gratuitous violence, hold out for our review of Eidos Interactive's Thief: Deadly Shadows later this summer. ■

You're a bad, bad man and you shouldn't have a shotgun in hand. But in this game world, you'll need it.

BY SAMIT GUPTA CHOUDHURI

Manhunt

$49.99
Rockstar Games
www.rockstargames.com/manhunt
ESRB: Mature

The number of consumer electronic devices is proliferating and the complexity of using these devices in an interconnected world is increasing everyday. Most of these devices are not simply standalone items; they are meant to be connected to other devices, computers and networks. *CE Tips* will give you honest reviews of products available, **AND THEN TELL YOU HOW TO GET THE MOST FROM THE PRODUCTS** you purchase.

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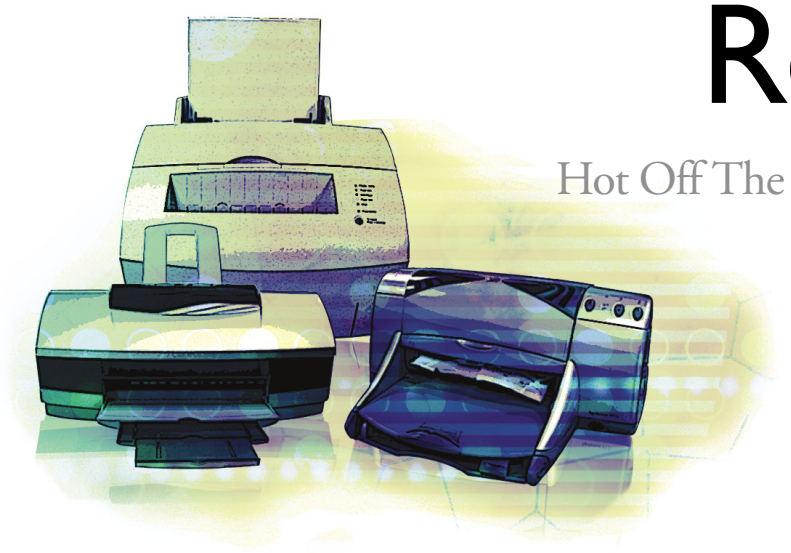
Hot Off The Presses: Home Printing History



For millennia, mankind's history has been chronicled on hard copy, beginning with drawings on cave walls in the Paleolithic Period 2.5 million to 200,000 years ago, through the invention of the printing press in the 15th century, to today.

The printing press made it possible for newspapers and books to record mankind's collective history and to spread knowledge far and wide. But the printing press was hardly the end of the line in the evolution of recorded history.

Thanks to another branch of the printing family tree—the computer printer—now it is possible for each one of us to record our own personal history at home much like our earliest cave-dwelling ancestors did, with pictures or words.

From Drawings To Text

According to the online edition of the Encyclopaedia Britannica (www.britannica.com), early humans used symbols called "ideographs" to represent concepts and to form a pictographic language that they used to record their experiences and ideas with whatever means were available at the time.

By the second millennium B.C., says the Encyclopaedia Britannica online, at least two changes were taking place: Alphabetic writing systems based on phonetic sounds were emerging, and so were different writing surfaces, including silk, papyrus, and, at the beginning of the second century A.D. in China, paper.

But several hundred years passed before the printing press was conceived and produced, along with reusable metal typefaces, circa 1450, in Europe. The invention of the printing press is widely attributed to a German silversmith, Johannes Gutenberg.

In the 19th century, metal typefaces came to be used in the typewriter, perhaps the most obvious ancestor of the computer printer. The Encyclopaedia Britannica says that an American, Christopher Latham Sholes, constructed the first practical typewriter in 1867. He patented the device one year later and set to work on improving it.

In 1874, Sholes and gun maker E. Remington and Sons brought the first typewriter to market, and with it, says David Weil, executive director and curator of the Computer Museum of America, the stage was set for the eventual debut of the modern computer printer.

From Text To Drawings

Although efficient, the Gutenberg printing press and its early descendants had significant graphical limitations. For example, it was not suitable for pictographic languages such as Chinese. Beginning in the 1960s, however, printing technologies were introduced that could overcome those graphical limitations. The first digital printer hailed from The Seiko Group, the timepiece maker, in 1964. Called the Crystal Chronometer 951, it was custom-designed to attach to a timing device and print the timings of athletes at the Olympic Games in Tokyo, says Steven Semos, product manager for consumer inkjet printers at Epson America.

Four years later, Semos says, Seiko unveiled the world's first "mini-printer," the EP-101, which connected to different types of industrial equipment.

Timeline

1450 - Gutenberg printing press

- **1867**—Christopher Sholes invents the typewriter
- **1920**—IBM invents the first electric typewriter
- **1953**—first high-speed printer developed, for Univac computer
- **1964**—Seiko unveils the first digital printer
- **1968**—Seiko releases the EP-101 miniprinter
- **1970**—Centronics makes the first dot matrix printer
- **1971**—PARC invents the laser printer
- **1985**—Canon releases the first inkjet printer, the BJ-80.
- **1992**—Epson's micro piezo inkjet printer debuts
- **1997**—Epson releases its first Stylus Photo printer, which uses six independent inkwells
- **2003**—Kodak's EASYSHARE Printer Dock is the first digital camera docking station to incorporate a photo printer.

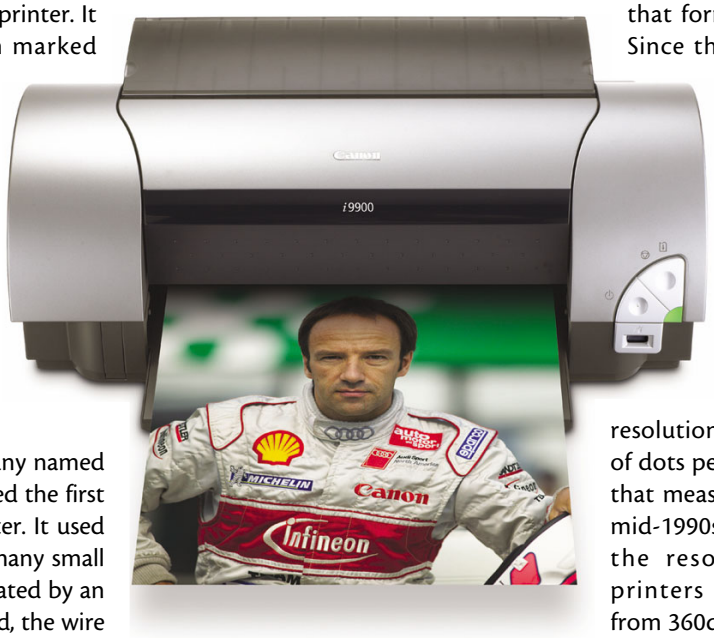
The EP-101 was a drum-type printer. It contained a spinning drum marked with letters and numbers, an inked ribbon, and hammers. The paper and the ribbon sat between the drum on one side and the hammers on the other, and as the drum spun to position a character behind the ribbon, the hammer would strike the paper, imprinting the character on the page, Semos explains.

In 1970, Weil says, a company named Centronics made and marketed the first serial impact dot matrix printer. It used a print head that contained many small wires, and each wire was actuated by an electromagnet. When actuated, the wire struck a ribbon, which in turn impacted the paper and imprinted a tiny dot on the page. The printer arranged single dots on the page to form an image or a simple typeface.

By October 1980, Epson had created a dot matrix printer that was so good it became the "de facto industry standard for dot matrix printers," says Weil. It was the MX-80, which sold for $500.

Meanwhile, since the 1970s engineers also were busily developing other kinds of printers: the laser printer and the inkjet printer, which are the dominant types today. Xerox's PARC (Palo Alto Research Center) invented the laser printer in 1971. The IBM 3800 was a "gas laser electrophotographic printer," explains Larry Ernst, an engineer at IBM's printing systems division. It created a print by putting paper in contact with a photoconductor, which works with a laser and other parts to lay down toner in the form of an image or text on paper. Whereas a modern laser printer uses a "solid-state laser," the original laser printer used a lower power gas laser. Initially, personal laser printers cost in the vicinity of $2,000, Weil notes, and now you can buy one for about $200.

The inkjet printer was first conceived by accident in 1981, by an engineer working for Canon, recalls John Lamb, senior marketing manager at Canon USA's consumer imaging group. The engineer had placed a soldering iron near a syringe filled with ink, and when the soldering iron touched the syringe, the ink bubbled up and shot out. It occurred to the engineer that there were potential applications for directing ink onto a page, Lamb says.



Canon's i9900 photo printer is significantly different from (and better than) Canon's first inkjet printer, the Bubble Jet BJ-80.

Canon introduced the first inkjet printer, the BJ-80, in 1985, featuring its Bubble Jet technology. The technology heats ink in a nozzle, forming a gaseous bubble, which ejects the ink in droplets onto the paper.

Epson introduced another inkjet printer technology, known as micro piezo, in 1992, in the Epson Stylus printer. It is a **piezoelectric system**, which stores ink in a chamber that changes shape when voltage is applied to it. (A material with this property is known as a piezo material.) The shape change causes the ink to be ejected from the chamber. And because the micro piezo system can exactly control the shape of the chamber, Semos says, it can exactly control the size and shape of the ink droplet, as well.

In the mid-1990s, droplet sizes were so big that it was easy to see the dots that formed the image on the page. Since then, engineers have concentrated on methods for producing much smaller droplets, and now the droplets are so small that 80% of people can't see the dots with ease, Lamb says. The result is inkjet printer output that's good enough to make photo prints.

Another important aspect of photo prints is the resolution of the output, the number of dots per inch (dpi) on the page, and that measure has been rising since the mid-1990s, notes Semos. For example, the resolution of Epson's inkjet printers has risen to 5,760dpi now from 360dpi in 1992.

In the late 1990s, a type of printer dedicated to making photos, dye-sublimation, emerged in the consumer marketplace, although it had been available commercially since the 1970s. Instead of liquid ink, it uses a dye-infused film and special porous photo paper.

Today, text printing has achieved speeds that were all but unimaginable in Gutenberg's time, as fast as 22 pages per minute on an inkjet printer. And with the world switching to digital photography, printer makers are responding with new models aimed squarely at home photographers, as well as with new kinds of inks and papers, for a wider color gamut and more accurate colors that yield a better print quality.

Today, Cloutier says, printing has finally evolved to where it can produce "fully formed characters and images on paper that are as good as the eye can perceive or better, at a cost that is so inexpensive that anybody can afford it, not just commercially, but personally."

"The two elements technology will not replace, at least not yet," Weil concludes, "are the human's mind and eyes. They (and we) are still responsible for what goes on the paper, in what manner and for what purpose." CE

BY ROBERT E. CALEM

CE Pick Of The Month

Worlds Collide (& We Like The Results)

This month's CE Pick Of The Month isn't exactly a new item, but it's one we've never recognized on this page before (although it was on our cover last month), and frankly, we probably should have.

Lots of companies blather on and on about convergence, but in most cases, it seems like there's some crippling compromise that results from trying to pack too many functions into one device. For example, buying a TV with a built-in VCR or DVD player often means you don't get the premium features you'd get in either device on its own, and blending mobile gadgets is even dicier because of obvious size constraints. Phone/PDA hybrids have classically been either too big to be effective as phones or too small to make good PDAs. Until now, that is.

palmOne's Treo 600 smartphone is the first true example of the all-in-one digital device; it does the work of at least four traditional gadgets and looks cool all the while.

When HandSpring first unveiled its Treo smartphone, users and pundits alike gave it high marks for successfully combining the right elements of a phone and a PDA, and the device went on to be so popular that Palm (now called palmOne) bought the company. The Treo 300 is still a pretty cool device, and you can get one for $249 or $99 with a new Sprint service plan. But the Treo 600 is the coolest and best example of convergence on the consumer electronics market today.

For starters, the 600 has all the wireless phone and PDA functions you could possibly want, including a generous color touchscreen LCD, a full QWERTY keyboard, a memory card slot for SD (Secure Digital) and MMC (MultiMedia Card) media, and all the trimmings. That means you can keep track of all your contacts and appointments, surf the Web, send and receive email and SMS (Short Message Service) messages, and jabber yourself silly, all with one device. What's more, though, it's also packing a 640- x 480-pixel resolution digital camera, so you can take and send pictures, set up photo caller ID, and so on. The 600 is also a suitable MP3 player thanks to its stereo headphone jack, and you can even play a few games on it.

Given all the stuff the Treo 600 can do, at $600 it's really quite a bargain, and you can get one for less than that with a service plan from Sprint (starting at $449 at press time). It's less than an inch thick, is 4.4 inches high x 2.4 inches wide, and weighs about 6 ounces, or less than half a pound, which means you'd be hard pressed to carry any two of the items the Treo 600 replaces in the same amount of space.

In short, we can't think of any compelling reason not to have one, and that's why it's our CE Pick Of The Month for July. CE

IT'S SHOWTIME

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USB Adapter

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